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Vol. 7, No. 1.

NEW YORK, MARCH, 1909.

426597

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PARTIAL CONTENTS:



HIGH WHEEL BUGGY CARS—What They Can Do and a Comparison with the Low Wheel. Illustrated.

THE SUN HARNESSED—Something That May Prove the World's Greatest Source of Power. Illustrated.

THE KNIGHT ENGINE—Full Explanation of the Slide Valve Silent Engine. Illustrated.

THE EFFECT OF MOVING—How Dealers May Have a Running Car in Their Windows. Illustrated.

A FINAL RECKONING—Why Automobile Drivers Will Finally Reach the Pearly Gates.

MODERN REPAIR SHOPS—Some Suggestions as to the Various Departments. Illustrated.

TROUBLE DEPARTMENT—The Usual Clearing House of Car Operating for Puzzled Drivers.

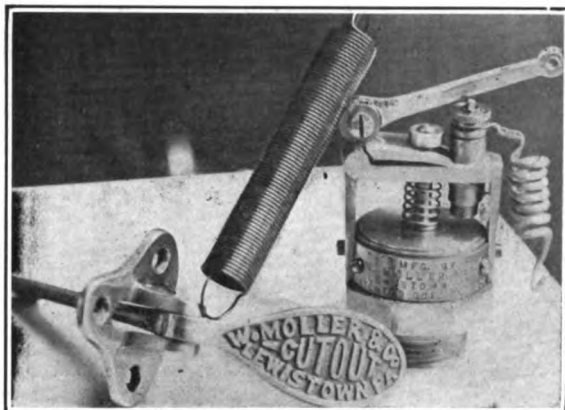
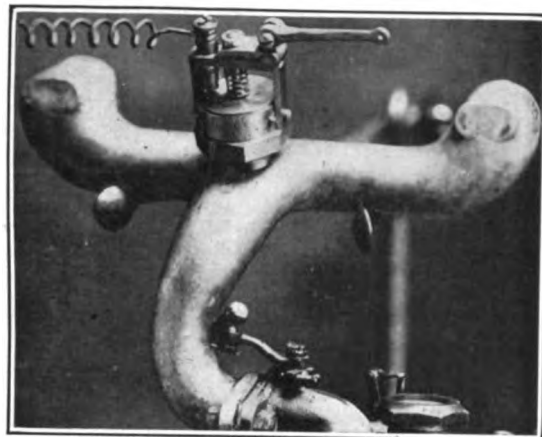
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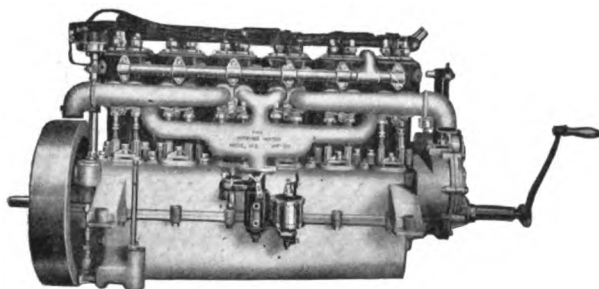
Any car with this Attachment with one or any number of cylinders, whether two or four cycle, the Motor can be instantly cut out without interfering in any way, and without throttling the mixture as it instantly cuts off the combustible mixture and ignition, leaving the car to run with its own momentum and economizing the fuel.

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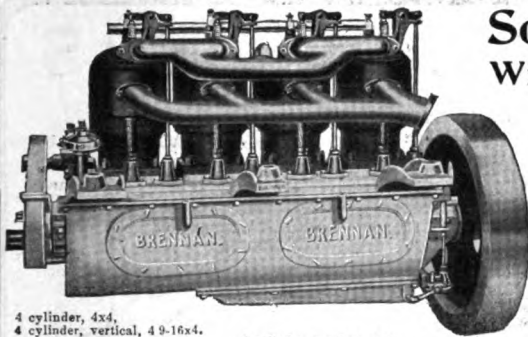
Think what this means to the repairman. A Goodyear tread 2-16 inches thick will frequently outwear one 4-16 inch thick made from other material.

Think of the saving you can make on the cost of your repairs. You can afford to make better repairs at more reasonable prices. To retain repair business now you need better quality and reduced cost in view of the present prices of tires.

We offer to the automobile tire repairman for his own work the stock which has made Goodyear Tires famous for wearing qualities, stock made by the secret Goodyear formula.

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The Goodyear Tire & Rubber Co.
AKRON, OHIO



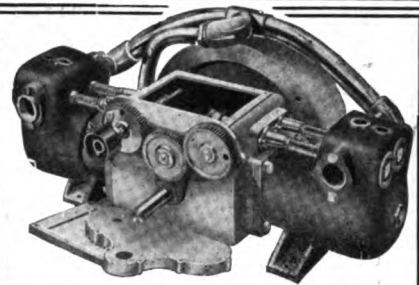
4 cylinder, 4x4.
4 cylinder, vertical, 4 9-16x4.
4 cylinder, vertical, 4 9-16x5.
4 cylinder, vertical, 5x5.
4 cylinder, vertical, 5 1-2x6.

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Four and six cylinder chassis to order.

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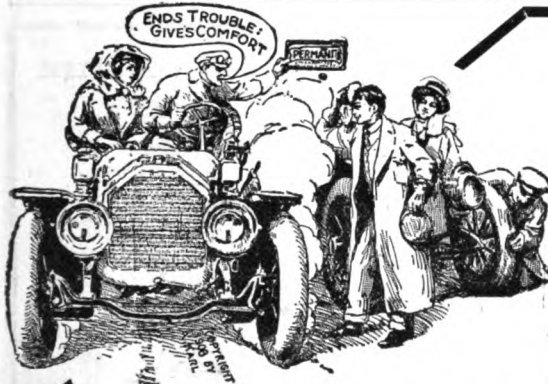
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2 cylinder, 4x4, 4 3/4x5, 5 1/2x6 and 6 1/2x7.

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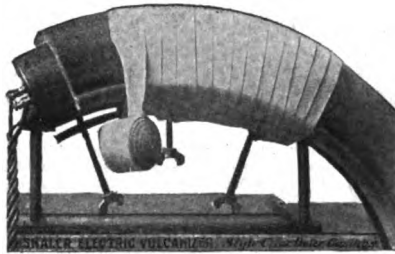
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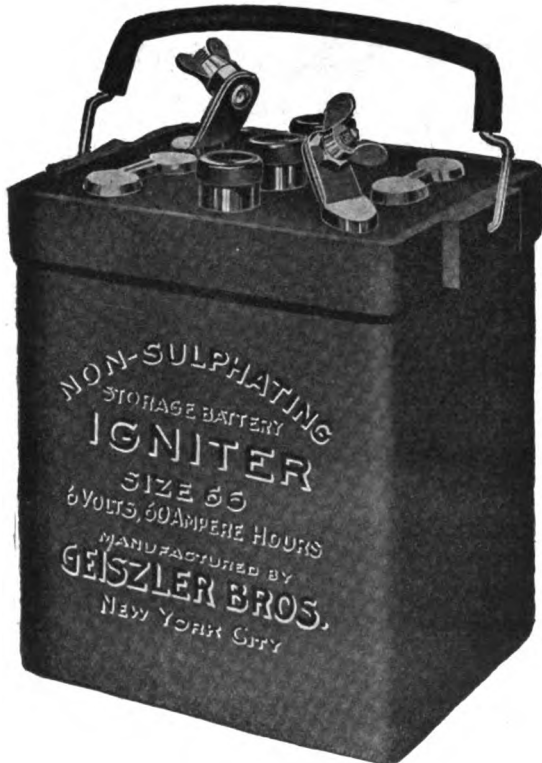
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6 VOLTS
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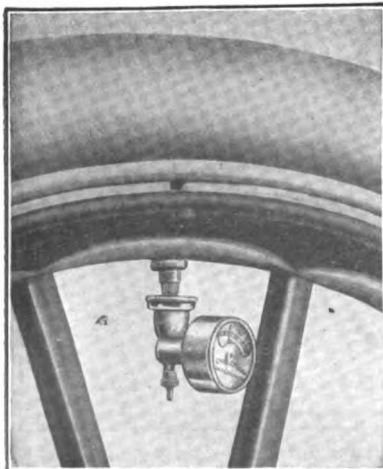
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The 1909 Model of the Ideal Lawn Mower Grinder grinds the Reel Knives to fit the straight blade, even if the latter is bent and out of shape—something never done before, and the most important feature of lawn-mower sharpening. Has 5-in. ball bearing grinding wheel, babbitted bearings, twice as easy running as any other. Grinds either right or left-hand Mowers perfectly in fifteen minutes without removing ratchets or wheels. We are the originators, and six years' experience has shown us how to make them perfect.

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Successors to The Root Brothers Company,
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Miller's Tire Pressure Indicator.

LIST PRICE, \$3.50.

Instantly attached or detached from the valve, and shows the exact pressure in pounds per square inch in the tire. By having the correct pressure you greatly prolong the life of the tire and save the cost many times in one year. IF YOUR DEALER CANNOT SUPPLY YOU WE WILL SEND SAMPLE, POSTPAID, UPON RECEIPT OF \$2.50. Your money refunded if not satisfactory. We also manufacture a full line of vulcanizers. Send for catalog.

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Your Gas Lamps by turning a gas cock and an electric switch, both located on the dash of your car where you can reach them without stopping or

GETTING OUT

Parks Tire Repair Specialties.

When a round plug is used a round hole must be either cut or burned in the tire. Thus a portion of the fibre of the tire is lost and can never be replaced. The straight insertion necessary for a flat plug does not remove any of the fibre.

As the circumference of a round plug is three times its diameter, the joining line between the plug and the tire is a third longer in a round plug than in a flat one, increasing the chances of leakage in that proportion.

In a round plug a large surface is exposed to air pressure, while in a flat plug this surface is reduced.

Owing to the manner in which the flat plug is wedged into place, the edges of the tire will press firmly against it, whether tire is hard or soft. Flat stem plugs up to $\frac{1}{2}$ inch in size will stay without cement in a tire containing a fluid preparation, while round plugs will not stay at all.

Fluid cannot escape from tire when adjusting flat plug, as it will through a round hole. Vulcanizing is unnecessary when flat stem plugs are used.

No tape need be used when a flat stem plug is properly adjusted.

Cement Injector

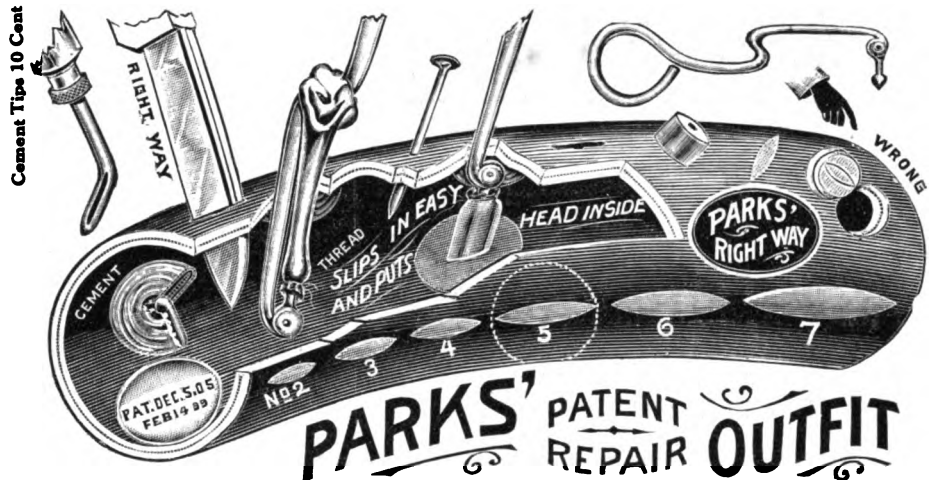
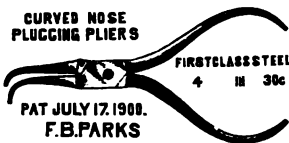


PATENT APPLIED FOR
Slot in curve to distribute cement where
Plug goes in tire—scrapes off
bloom at same time.

Small Size 30c. Large Size 40c.

When not in use put nozzle in raw potato and it will not dry or corrode and will always be ready for use. This is very handy in case it is used for patching, as the cement is kept from evaporating and always in good condition.

Plugging Pliers



This view shows how the plugs fit in sharp edge in tire and the two sharp edges wedge in tightly in tire no matter how your tire is cut. Be sure to get your plug to pull tire the same way as cut and you cannot tear hole any larger. Use good cement and you will have good success fixing tires with flat plugs.

We have Repair Shops that use no other but the flat stem plugs and Jobbers that sell them.

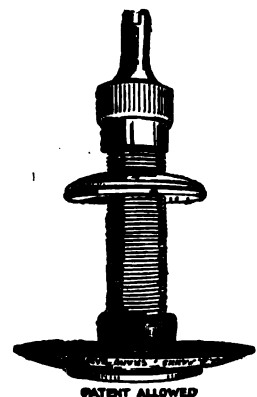
This is the only successful Plug Insertor on the market; a specialty to our hollow flat stem plugs. The illustration shows the plug ready to insert, after insertion stem is ready to cut off.



(CUT SHOWS FULL SIZE OF TOOL) Price 25 Cents.

makes it insert easily and when the plug regains its normal size it fills the hole perfectly. This tool is the result of years of careful study and experimenting and we class it most perfect, easily manipulated and smallest tool of the kind manufactured.

You will note in illustration where plug is ready to insert it is stretched to one-half its normal size, one part of tool pulling end of stem, the other pushing the head, thus giving a leverage that no other tool has. The plug being smeared with cement



Patented Jan. 9, 1900

This Casing or bushing is used where stem is pulled off and a large hole in tire. This rubber shoulder fills in and makes the metal base valve air tight.

No. 3, 9-16 in., per 100.....\$4.00
No. 2, 7-16 in., per 100..... 3.00

Flat Stem Plugs

- No. 2—1 cent
- No. 3—2 cents
- No. 4—3 cents
- No. 5—4 cents
- No. 6—5 cents
- No. 7—6 cents



We guarantee our Plugs to be the softest and best rubber made.

TRIAL ORDER

Assorted boxes of flat plugs and bushings only \$2.00. Order a sample box and after trying them you will always keep our flat plugs and bushings in stock.

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We manufacture the finest line of Repairing Tire Specialties and guarantee all goods first-class, good sellers and good profits to the automobile and bicycle trade. Look at them and see how they work.

Our Complete Repair Outfit
is the result of years of practical experimenting. Price 50c.

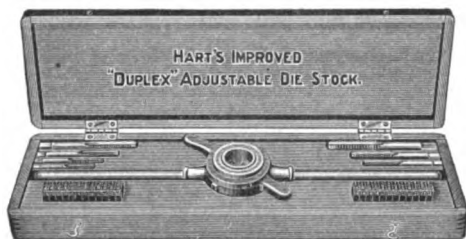
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"VELOS MAKE AND BREAK DISTRIBUTER"

The simplest and most economical igniter.

Used with one non-vibrator coil for any number of cylinders.

It will end your ignition troubles and save your batteries.

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Best in the World for Washing Automobiles. No Garage should be without it.

Contains No Free Alkali. Positively Will Not Soften or in any way injure the varnish or dull the finish of the car.

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"K. C."

"Kitsee Changeable" DRY STORAGE BATTERY

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VOL. VII., No. 1.

NEW YORK, MARCH, 1909.

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TILDEN FOUNDATIONS

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HIGH WHEEL BUGGY CARS.

What They Can Do and How They Compare With the Low Wheel Pneumatics.

From O. H. Hampton, Indiana.—It is hardly worth while in the middle sections of this country to write a chapter of information about high wheel vehicles, as the thousands of them in daily use speak for them-

counter shaft to both rear wheels. Brake, contracting band on each rear hub. Brake and one slow speed operated by foot pedals. High speed and reverse by side lever. Wheels, front and rear, 38-inch tires, 1¼-solid rubber.

The vehicle was found to be admirable for driving in crowded streets. The driver's seat is four feet above the ground, enabling him to get a good view of every-



High Wheel Buggy Car. Base Price, \$450.

selves. But in the East we are told that they are as yet somewhat of a curiosity, and for that reason it is thought that the following may prove of interest and possible value to your eastern readers.

Having determined to make an exhaustive test of this type of vehicle, careful examinations of a dozen or more makes were made, after which a buggy or run-about made by W. H. McIntyre Co. at Auburn, Ind., was selected as perhaps one of the best types of this style of motor buggy.

The machine was not one specially made for the test, but was taken at random from machines in stock, and the only selection made was to take the one that was most convenient to get out of the room. The makers of the vehicle knew nothing about what was to be done with it.

The motor is of the two cylinder opposed type, four cycle, 4½x3¾-inch stroke, capable of developing twelve horse power. Transmission, planetary type, two speeds forward and one reverse. Drive, sprocket chain from engine shaft to counter shaft, and from

thing, and the short wheel base (70 inches), makes the movements of the vehicle very quick and sensitive to the steering gear. It is easy to drive it through tight places that require sharp, quick dodging, which in many cases could not be done with machines having a long wheel base. If a sudden stop has to be made, one push of the foot on the brake pedal slides both rear wheels. If a sudden slowing of speed is needed, let the motor continue to run, pull the side lever back and it acts as a brake. If the driver has to back, a harder pull on the lever starts the vehicle backward at any speed that is desired. When ready to go ahead again, push the lever forward and the vehicle starts forward at once.

As the vehicle weighs but 1,200 pounds it can be started or stopped much quicker than a heavier one. As to skidding on wet streets, there seems to be little difference between the two kinds of tires, but on brick paved macadam roadways the solid tires have the advantage.

This vehicle has been driven 4,000 miles by the

writer over all kinds of country roads, in all sorts of conditions (except when covered with ice), through farm fields, over fresh plowed ground, and through the woods—where there was no underbrush of course—and has never been moved a foot except by its own motor power.

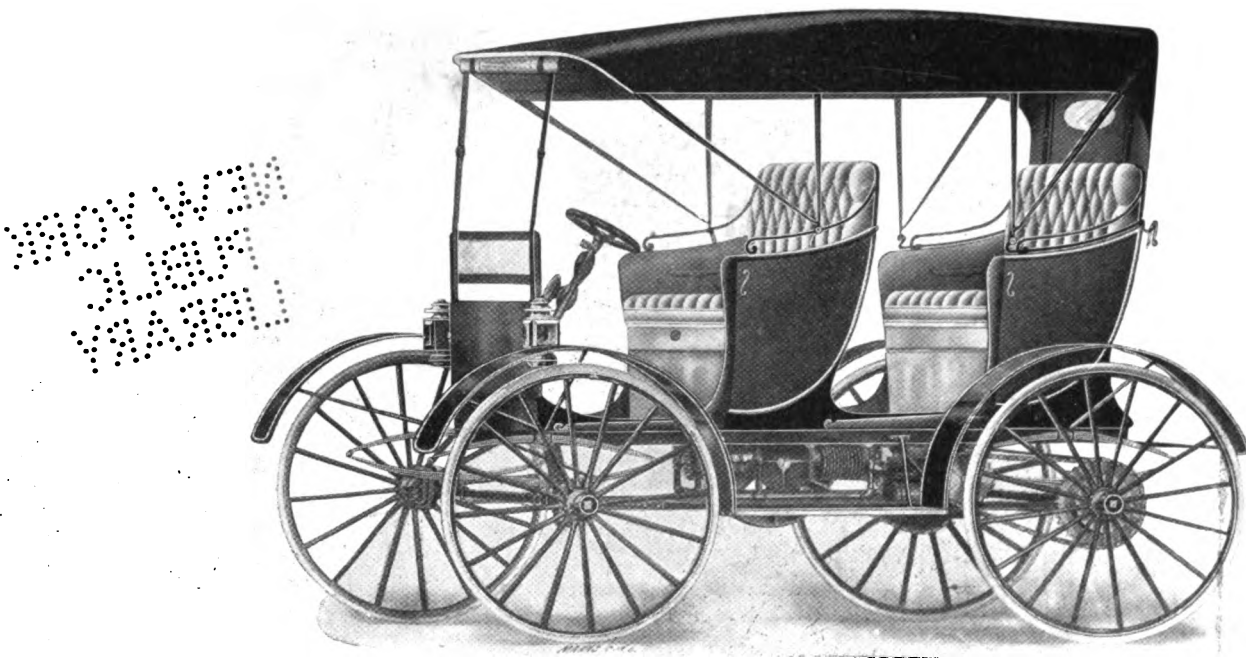
It has never had to be stopped on the road because of anything being out of order except on account of ignition and carburettor troubles, and never more than fifteen minutes at any one time on account of these.

Its work on gravel roads, not too hilly, in good condition, is an average speed of twenty miles an hour, the average gasoline consumption at that speed being one gallon for each twenty miles. If the road is hilly, the average speed is slower, as a prudent driver goes

so high the big cars cannot clear it and the single track roads not wide enough to take either side of the gravel. The buggy auto has 18 inches road clearance, and if the new gravel has been driven over by just one country wagon the solid tires will follow its track with ease at almost full speed.

Owing to the height of the buggy above the ground, and the narrowness of the tires, these vehicles raise but a small amount of dust, and there is practically none of the suction in the rear, which soon covers with dust the backs of the rear seat passengers in a touring car.

The springs on this buggy are two, full elliptic, set on the middle of the axles, and this sort of spring does wonders in the way of making easy riding. When



High Wheel, Formerly Buggy Car. Base Price, \$600.

slower down a hill than on the level, and, of course, he has to go slower up the hills.

On muddy roads, the trial was an ordinary single track country road through a rolling country, the road sloping one way or the other most of the way with some fairly stiff grades. The road had been frozen and had just been thawed by a warm rain. It was so soft in numbers of places that the country wagons had cut routes six inches deep in it. The car was driven over twenty miles of this road in just two hours. The motor was given all the fuel it could use throughout the entire trip. Several of the hills that could have been taken on high speed when the road was good, had to be taken on slow speed after getting half way or more to the top on high speed.

In a trial in wet snow, three inches deep had just fallen. The road was not broken at all. Distance travelled, twelve miles; time, forty minutes. No skidding occurred.

One of the torments of the autoist during the autumn season is the many miles of freshly gravelled roads in this section. It is one of the terrors for the big cars. It frequently happens that it is all the car can do to drag itself through it, while the passengers walked and sometimes had to encourage the car by pushing it. The ridges of fresh gravel are frequently

there is a jolt the person on that side gets but half the shock, but if the vehicle has a spring at each of the four corners of the frame, the person above it gets all of it, and the twist and strain on the frame of the vehicle is twice as great. It is objected that springs set on the middle of the axle are harder on the axle. If the axle is strong enough to stand it, what is the difference?

On a very solid road the solid tires jolt somewhat more than the pneumatics if they run over a stone or other small object higher than the general level, but when rising onto or dropping off a rough bridge end or other place where the entire wheel has to rise, the difference is not noticeable for the reason that the high wheels do not rise so suddenly. While testing the buggy car the writer had perhaps fifty different passengers riding with him, and most of them remarked about how easy it rode.

The 4,000 miles travelled by this machine has worn out the tires. They will soon have to be replaced by a new set, which will cost \$25. Not only are the tire expenses less, but it is worth something to be relieved from all uneasiness about punctures and other tire troubles.

It is asserted that the solid tires will jar the machinery to pieces. The jarring has had no effect on

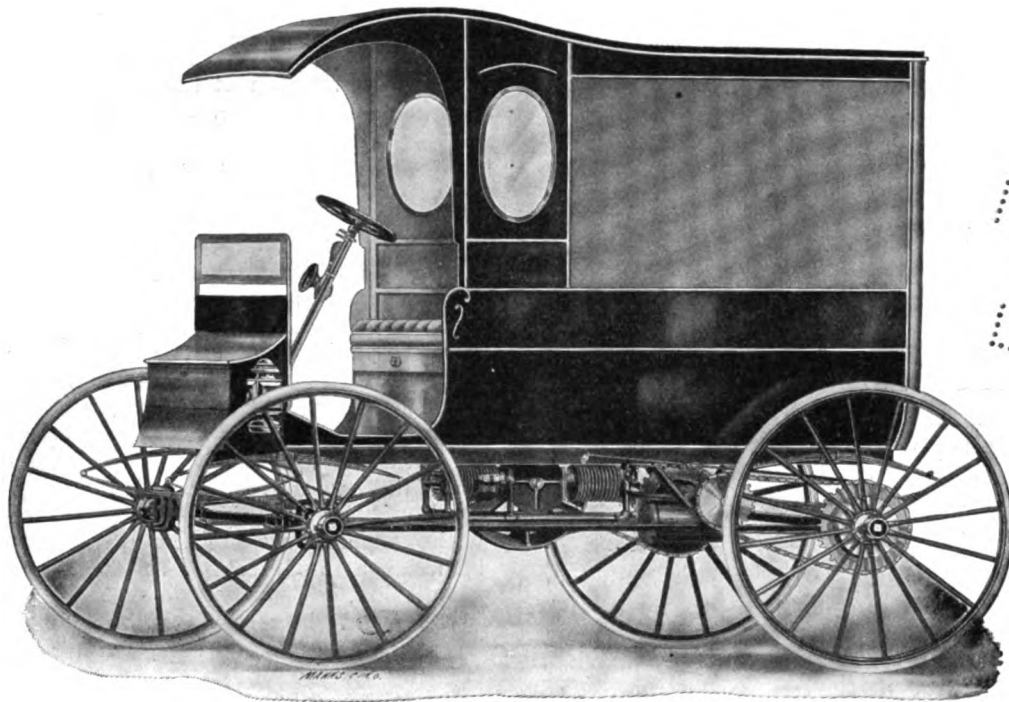
the machinery in this vehicle. It is as good as new in every respect except a reasonable amount of wear in the bearing parts. It has been found, however, that larger tires are better and more economical, as a large solid tire will last longer, in proportion to its size and cost than a small one, and the large one has more resiliency. It is found, too, that on roads that have been muddy and are afterward frozen while cut up with tracks of horse drawn vehicles, that the motor did not drive very well because the tires would get in the tracks of the other vehicles. Two-inch tires would have been much better on this sort of road.

The body is not fastened to the chassis in any way except by four bolts. The belts can be removed and the body lifted off by two men in five minutes, and

F. Nicholson, of Albany, was returning from a trip to Saratoga Springs with his wife and her mother, Mrs. Rosina Mosher. In the accident Mr. Nicholson was killed and the two ladies were injured. Damages in \$100,000 are sought for the death of Mr. Nicholson and \$25,000 each for injuries to his wife and her mother. The accident is alleged to have been caused by the narrow and dangerous condition of the highway. Mr. Nicholson was turning out for a carriage when the wheels of his car slipped over an embankment and the car turned turtle.

The Grafting Chauffeur.

"Probably the grafting done by chauffeurs is worse in New York than elsewhere, and those in the tire



High Wheel Van Car. Base Price, \$825.

can be replaced and secured in the same length of time. Drivers who have had to crawl under a car and lie flat in the dust or mud will appreciate this feature.

As to the difference in price, the buggy vehicle illustrated herewith sells for \$525.

Causes for Breakdowns.

Any one of the following troubles may be the cause of a motor stopping or not working properly: soot or grease on the spark plug; defective insulation of the spark plug; points of the spark plug too far apart; contacts of the coil vibrator badly corroded; broken wires or loose battery terminals; leaky admission or exhaust-valve; seized piston or bearing; broken valve-stem or valve-spring; batteries exhausted; defective spark coil; poor contact at the commutator; defective insulation of the secondary wires; broken piston ring; stuck piston; defective packing.

Big Damages for an Accident.

Three actions have been brought against the town of Stillwater, N. Y., for damages aggregating \$150,000 as a result of an auto accident on what is known as the Creek Road, near Mechanicsville, in the town of Stillwater. The accident happened last July when William

trade see more of it than those in any other line," says J. B. Cavanaugh, the Fisk tire manager in New York. "I have seen," he says, "a chauffeur take off a complete tire equipment only a fortnight old and 'scrap' it and order a new outfit, and I know a man who thinks it all right to spend \$250 a month on tires. Yet I see less of this thing than others in this line, because of the Fisk people being the only ones who refuse absolutely to pay any commissions. It is enough to make strong men weep to see the way motorists are worked by salesmen and chauffeurs for the sake of the commissions paid, and all because the owners will not learn about tire quality and the way tire business is done. It makes one think at times that honest goods and clean methods are a mistake. It is high time that owners should give as much study to tires as they do to engines. There is quite as much to study, and the tire upkeep of a car is greater than the engine upkeep."

Graphite as a Lubricant.

Graphite is one of the best lubricants for any purpose, the only objection to its use in automobile cylinders being that it is likely to clog up the oil pumps and leads.

Automobile Dealer and Repairer

A Magazine of condensed and compact information for busy readers.

OFFICIAL ORGAN OF THE NATIONAL RETAIL AUTOMOBILE DEALERS' ASSOCIATION

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ADVERTISING RATES MADE KNOWN ON APPLICATION

NEW YORK, MARCH, 1909.

Missing Numbers—Our readers are requested to remember that it always gives us pleasure to re-send numbers which have gone astray in the mails.

THEY GET NOWHERE.

As a broad proposition the earth was made for man to travel on, the sea for fish to swim in, and the air for birds to fly in. It is true that primitive conditions have so changed that the sea is now used as a highway for human travel, and possibly the air may be soon used for the same purpose.

Indeed, aerial navigation is already an established fact. But the peculiar thing about it is that the navigators have not as yet got anywhere. The Wright brothers have accomplished much. They have remained in the air for more than two hours, sailing gracefully and with apparent ease—but always in about the area of a 50 acre lot. Why not go somewhere, gentlemen, alight, and then return? Or if alighting is difficult, turn around and come back without lighting. The English channel at the Strait of Dover is not more than 40 miles wide, and a reward of several thousand pounds has been offered to any airship that would fly across it. It would only be about an hour's run for the Wright air ship. Why let that reward and the undying fame it would create go abegging?

At this writing we learn that the Wrights are about to give flying exhibitions in Rome, and that they have gone down there from Paris to look the ground over—and by train. Why not go by flying machine? It would only be but about an easy two days' run. The first day they could make Nice or Monte Carlo, and the next day save something in distance, as the crow flies, by cutting across the placid and delightful Mediterranean.

We would not for the world put a straw nor a cloud, so to speak, in the way of sailing in the heavens. It is a consummation devoutly to be wished. Moreover, the Wright brothers and all the other high flyers have shown good sense and discretion in not starting right off to go somewhere before they got the hang of their machines and of the heavenly highways, which, by the way, have no grades or obstructions of any

kind; nothing to puncture tires nor cause the wheels to skid.

But now that they can sail around and around, and gyrate and cut figure eights—now that they have got the hang of the thing—why do they not take a run over to Limoge, or up to Brussels, or down to Lyons, some fine day?

Thus far the flying machine is an amusing toy and nothing more. Quite likely going from one place to another will finally be an accomplished fact, but—please get a move on, gentlemen.

So far the only vehicle besides a railway train to get anywhere is an automobile.

FIVE AUTOMOBILE LAWS.

Five automobile bills have recently been introduced into the New York assembly. They are as follows:

First—Making it a misdemeanor to tamper with machines. Second—Making it larceny to use a machine without permission of the owner. Third—Abolishing the arbitrary speed limitations, and compelling the operation of machines at all times at such rate of speed as may be reasonable and proper under the surrounding circumstances. Fourth—Requiring all collected fines to be turned into the State treasury. Fifth—Allowing licensed machines of other states to be operated in this State without additional license only in case reciprocal courtesy is extended to machines licensed in New York State.

As to the first and second it seems as though the common law should meet all requirements of justice. That is to say, there is as much reason for making it a misdemeanor to tamper with machinery of any kind as with the machinery of an automobile. And the same method of reasoning applies to the second. If it should be made a larceny to use an automobile without permission of the owner, it should likewise be made a misdemeanor to use a horse without such permission.

If our legislatures would but give as much time to law simplification and codification as they now do law creation, they would be of far more public service.

The third bill mentioned above is a good one. Nothing more perniciously nonsensical can be imagined than to fix arbitrary speed limitations. Whenever a car is being driven so fast as to endanger the public safety, it is going too fast, no matter whether the speed is five or fifty miles an hour, and if it is not endangering the public safety it is not going too fast, even though the speed is one hundred miles an hour.

The fourth bill, requiring all fines to be turned into the State treasury, likewise has its obvious objections, although it is, of course, plain to see why it is favored. One need not have any great bias or affection for the popular term, "home rule," to feel that such fines should be turned into the treasury of the town or city where the damage was done, justice meted out, and where the fines were collected.

The fifth bill, if enacted into a law, would necessitate some trouble to separate "the sheep from the goats," and furthermore, there will soon be no law in any State forbidding cars of other States from being operated in them without additional license.

NOTHING CAN TAKE THEIR PLACE.

One reason why the pneumatic tire is an ideal shock absorber is because it reduces or destroys the shock before it is conveyed to the machinery of the car. Springs of the best patterns are well enough for easy

riding, but they do not minimize the shock upon the chassis.

According to reports shock absorbers are steadily becoming more popular, and there are claims that in the endurance tours they have played an important part on each winning car. Yet nothing has or can do so much to make easy riding and to eliminate shock from the engine, the connections and the more or less delicate drive and transmission parts, than good-sized wheels and plain pneumatic tires.

PUBLICITY CONCERNS.

Most of the New York dailies have shut down on the press agent business as it relates to automobiles and it would seem to be time for the automobile publications to do the same thing.

Thousands of dollars worth of advertising have been printed during the past year under the guise of "news."

So successfully in fact has this business been worked by so-called "publicity" concerns that many firms and companies seem to have succeeded in getting about all the advertising they wanted without paying for it.

While we have not permitted the press agents to work us to any great extent it seems likely that they will do so still less in the future.

We are willing to be the vehicle for carrying as much "news" concerning automobiles and automobile accessories to our subscribers as may be desired, providing we are paid for it at regular rates of advertising.

PRICE AND QUALITY.

If you are a dealer and have not yet joined the National Dealers' Association, then you are neglecting self-interest.

Disguise it as we may, the tendency to produce manufactured articles cheaply at the expense of quality is nowhere so strong or so pervasive as in these United States of ours. This condition is working itself rapidly into the automobile accessory line. Too many dealers are seeking something they can sell for just a little less than their competitor can sell the same article, and too many manufacturers are trying to supply this demand for cheapness.

The automobile business is destined to be one of the greatest in a single line of anything in the country. To keep it from drifting into the realm of trading-stamp-catalogue, house-sight-unseen methods, necessitates co-operation among dealers.

LIGHT UP THE DOGS.

As it seems to be the settled custom to allow animals to freely roam the public highways, why not have a law compelling them to carry lights at nights? In the case of cows and dogs, for illustration, let there be one light in front and one in the rear. Chickens go to roost at dark, so lights in their cases are not needed. But they freely occupy the highways during daylight, so why not compel them to carry siren horns or whistles? And while we are about it, why should not pedestrians and vehicles of all kinds carry lights at night?

Cheap at Twice the Price.

From R. N. Hughes, New Jersey.—I think the AUTOMOBILE DEALER AND REPAIRER is a very good paper, indeed, and cheap at twice the price.

If you find what you want here, please tell your friends about it.

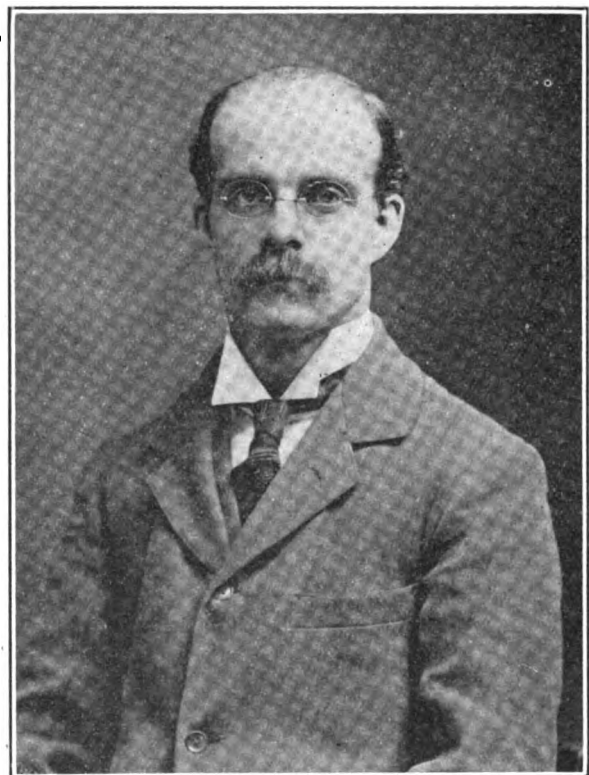
THE SUN HARNESSED.

An Invention Which May Revolutionize the Sources of Energy.

This publication does not often go out of its legitimate work of giving information to those who use, repair, buy or sell automobiles, and it is not doing so now when it gives with considerable detail an account of an invention to make electricity from the sun's rays.

That this has at last been accomplished has been successfully demonstrated by a Somerville, Mass., inventor, Mr. George H. Cove by lighting his workshop with electricity generated from a simple apparatus on the roof.

Electricians from the Institute of Technology in Boston who have watched with interest his experi-



GEORGE H. COVE.

ments, have declared themselves enthusiastic over his success.

Mr. Cove has demonstrated that the simple apparatus will develop and store sufficient electricity in one bright sunny day to light an ordinary house for about three nights or enough in two days to light for six nights. The invention will be known as the "Solar Electric Generator."

About a year ago Mr. Cove built a small machine about three feet square. This proving a success he constructed a machine of greater dimensions. With several improvements on which he is at present working, the efficiency of the machine, he says, will be increased. If the expected success comes with this feature, one day's sunshine will generate sufficient electricity to light a house a week.

The invention consists of a steel frame work to be placed where it will receive the direct rays of the sun. Short plugs of a peculiar metallic composition are set into this framework which is divided into sixteen squares, each square one foot square, and containing

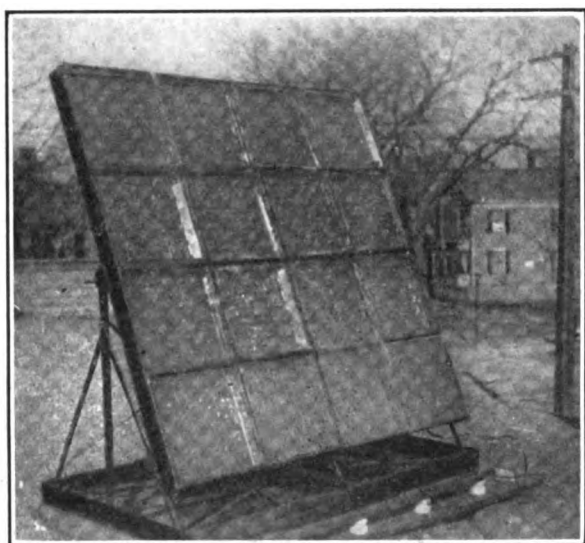
61 of the metallic plugs. These plugs are set with one end under glass while the sun shines on them. The other ends are exposed to the open air and sheltered from the sun's rays.

In the whole frame there are 976 plugs. The difference in the temperature of the two ends of the metallic plugs, one being in the direct rays of the sun and the other in the open air and sheltered from the sun, generates electricity.

If the sun goes under a cloud and the voltage drops below that of the storage batteries, an automatic circuit breaker, breaks the circuit between the machine and the storage batteries. The device is thus entirely automatic.

When the sun sets in the evening it automatically shuts off from the storage batteries and begins storing again with the rising sun in the morning.

Mr. Cove expresses himself modestly concerning his invention, but he has even thus far accomplished far



For Storing the Sun's Electricity.

more than any one else who has studied the subject. He says:

"The principal part of my invention is the peculiar composition of the metallic plugs which are acted upon by the sun in such a way that a current is generated not only by the heat rays but the violet rays as well. I have proven this by shutting off practically all the rays except the violet rays and the heat rays."

Mr. Cove says in reference to solar energy: "Although it was done in a very expensive way—too expensive to be practical, Ericsson, the inventor proved in 1868 that the sun's rays if properly utilized were capable of producing one horse power from every square yard of surface exposed to the sun's rays."

"The amount of natural power which is daily going to waste is almost inconceivable. Scientists claim that our coal fields and oil wells cannot last one hundred years, and I believe these natural powers must be utilized to preserve our other natural resources."

Mr. Cove, who belongs to Halifax, Nova Scotia, is a practical inventor and recently received a gold medal from the Canadian Government for his invention for utilizing the power of the tide in the Bay of Fundy, a working model of which was on exhibition at Halifax, N. S., in the fall of 1907.

He has devoted his time for the past seven years to the problem of utilizing natural powers, such as the tides, the sun, etc., and has secured patents on the

utilization of waste heat of stoves and furnaces and converting it into electrical energy.

His father, the late Joseph Cove of Amherst, Nova Scotia, was an inventor and made a specialty of flour mill machinery. Many of his inventions are now in use to-day in the great mills of the west.

At present there are five sources of energy in use, namely: Air, animal, water, wood and coal. The last gives far more power than all the others combined, if we are not mistaken in a hasty consideration, and this last will cease in the course of a few years, measured by historical periods. The greatest source of all we have not had—the energy of the sun. Sooner or later it will be done, however, and then the question of cost of propulsion of the automobile will be a mere bagatelle. As for its other possibilities, they are simply beyond quick computation.

LESSONS FOR DRIVERS.

Carelessness and Ignorance Responsible for Most Accidents.

There seems to be a decrease this month in the number of accidents reported—or rather a decrease in those that might have been easily avoided. Fewer occur from lack of attention to the brakes and to the general condition of the car before starting out, and fewer from the recklessness of new drivers. Another reason for a diminution of accidents where the driver of the automobile was in fault is of the increase in damage suits. In some cases car owners have been mulcted most outrageously, but possibly it may all be for the best, for it will result in increasing care as to speed. Below will be found some of the more instructive cases of accidents since the last issue:

A Midnight Ride.—In St. Louis six young men were driving at high speed late at night. A careless teamster had left a wagon obstructing the street. In turning the machine to avoid it a man was struck who afterwards died. The young men in the automobile were arrested, but probably they will suffer nothing more than a severe fright and a resolution to be more careful in the future.

A Frequent Cause of Death or Injury.—In Philadelphia a woman while hurrying across a street, passed in between two trolley cars and directly in front of an automobile. She was struck by the machine and sustained a fracture of the skull, which resulted in her death a short time later.

This May Have Been Unavoidable.—At Tampa, Florida, a car was going at a moderate speed when a man on a bicycle attempted to pass in front of it. He evidently changed his mind for he suddenly turned back before the car could be checked. He was run down and badly injured. Bicycles and automobiles seem to have an antipathy toward each other. In the case above reported the driver of the automobile had the reputation of being very careful, and it seems to have been a case where the bicyclist was to blame.

Caused By a Bursted Tire.—Near Egg Harbor City, N. J., the sudden bursting of the tire on a car caused it to skid and strike a telegraph pole. It threw one of the occupants out, and her skull was crushed so that she soon died. The little spaniel dog which she held in her lap was also killed. Two more occupants of the car escaped with some severe bruises.

Thrown Forty Feet.—In Hackensack, N. J., a party of young men, including the son of the Mayor, were out in a high powered car, late at night, when, in passing around a corner it collided with a telegraph

pole. One of the young men was thrown forty feet by the violent impact. He was picked up unconscious and bleeding, but will recover. The other occupants of the car were seriously injured.

Run Over By a Two-Ton Car and Lives.—In Freeport, Long Island, a big touring car struck a horse-drawn vehicle. The occupant was knocked out of the wagon and fell in front of the car. The driver applied the emergency brake and reversed, but the wheels passed over the man's body. It was expected that he would be picked up dead, but he merely complained of a pain in his side and at last accounts was on the road to recovery.

All Due to a Dog.—A dog ran under the wheels of an automobile at Savannah, Georgia, throwing the machine from its course. It took the sidewalk and unceremoniously entered a drug store. The damage to the machine and to the apothecary shop was a good deal, and the dog has gone where all good dogs go.

An Amateur Takes a Trial Spin.—In Brockton, Mass., a man who had recently purchased an automobile decided to take a trial spin just after dark. He headed it toward the street and bravely grabbing the speed lever, shoved it over to the last notch. The car started off with a bound and first knocked over the family clothes reel. After making another start it described the letter S and climbed the piazza of the next house, then it sidestepped and made a leap for the center of the street. It proceeded well enough for some time and made a circuit of the town, but the driver did not stop it quickly enough and it entered his garage before he had time to open the door. There was a sound of splintering wood and breaking glass and a dull thud. The damage was not as serious as it might have been, although the car has a battered headlight and a sprung axle.

A Melancholy Case.—A little eight-year-old child in Chicago sat in the front seat of a car with her older brother, and in trying to solve some of the mysteries of the chassis her little foot in some way became caught in the gears and the bone was shattered from the knee down. The limb was amputated to save the child's life.

A Manly Thing to Do.—The driver of a car in New York, which not long ago ran over and fatally injured Mrs. Loraine McCook, widow of General McCook, came back, some time after the accident was over, and surrendered himself to the authorities, although he might easily have escaped. He says that the car was going at a slow speed, but the woman appeared bewildered and fell. The mud guard struck her and she was injured so fatally that she died. He was held on \$3,000 bail, although the general impression seems to be that he was not to blame.

Be on the Safe Side.

Don't go too quickly near the pavement in case a deaf person, or someone engaged in other thoughts, steps off into your track. When passing a street car, face on, toot slowly rather than too quickly. If you make an error make it on the safe side.

Don't Overtax It.

A revolution saved is a revolution gained. There is an economic, a durable, and a pleasant speed to an engine, just the same as there is to a living person; a speed at which a person can walk and run without destroying the tissues or overtaxing the muscles of the system, so with the piston of an engine.

THE KNIGHT ENGINE.

Further Explanation of the Slide Valve, Silent Engine.

BY SYDNEY F. WALKER, M. E.

The construction of the Knight engine has caused a great deal of controversy in the United Kingdom. It is the invention of an American from Chicago, and it has somewhat upset all the previously conceived ideas of the construction of motor engines. On the other hand, it is really a return, though in a slightly different form, to the early practice in gas engines. It will be remembered, that the gasoline engine is a direct descendant from the gas engine; and in the early forms of gas engines, slide valves were employed for admitting the charge of gas and air, for exposing the charge to the flame with which it was then ignited, and for opening the exhaust valve, at the end of the explosion stroke.

Gas engine practice, in those days, had been based upon steam engine practice. For a long time, the slide valve ruled in steam. Again it was an American who first produced a valve, the Corliss, in steam engine work, that was better than the various forms of slide valves in use at the time. In the gas engine,

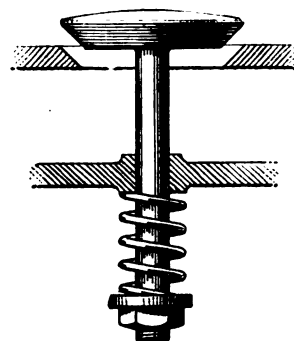


Fig. 1.—Usual Style of Mushroom Valve.

however, the slide valve was found to give a great deal of trouble. Unless the lubricant employed was of a very high class, if there was the slightest tendency to carbonizing, the surfaces of the slides were quickly dirtied, with the result that the engine refused to work. In addition to this, the slides wore rather quickly, and required to be faced up very frequently. In engineering shops, where gas engines were employed to drive, a special tool was kept to face the slides up, without taking too much off them, and it was always the practice to have a spare set of slides ready to go into the engine, immediately it showed signs of giving trouble. Owing to these troubles, as the manufacture of gas engines advanced, the slide valve was given up, and the mushroom valve, shown in Fig. 1, which is now so largely employed in motor car engines, took its place. With, however, the great increase in the power of motor car engines, and the very high speeds at which they run, the noise of the valves on closing, has become more or less of a nuisance.

It will be remembered that the valve is opened by the mushroom head being lifted, either mechanically, or by pressure, or suction, and is closed again by a powerful spring. It is almost in the necessity of things that the valve shall return smartly to its seat. There is a better chance of its closing properly, if it does so. To meet this question of the noise of the moving valves, Mr. Knight worked out the engine, which goes by his name, and in which there are no moving valves, of the mushroom type. As mentioned above, a return has been made to the slide valve, but in a totally different form to the early slide valve. In

the Knight engine, there are two cylindrical sleeves, shown in Figs. 2 and 3, forming liners to the cylinder, the sleeves being one inside the other. The sleeves have slots cut in them, at certain parts, and as they move up and down, at the proper moment for the entry of the charge of gasoline vapour and air, two slots in the two sleeves come opposite the gas entry port. At the proper moment for exhaust, at the commencement of the exhaust stroke, two other slots on the other side of the sleeves, also come opposite each other, and opposite the exhaust port. The sleeves move constantly up and down, over each other's surfaces, the outer one moving over the inner surface of the cylinder. The sleeves are moved by short connecting rods, worked from a shaft driven by a chain from the crank shaft. The shaft which moves the sleeves corresponds to the usual half-time shaft in the ordinary motor engine.

In addition to the above, the head of the cylinder is specially constructed. It is conical on the inside, and has a water jacket of its own, as well as the body of the cylinder. It has also piston rings surrounding it,

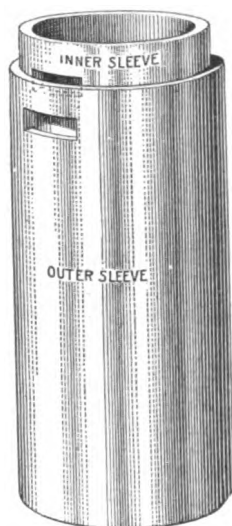


Fig. 2—Showing the inner and outer sleeves and slots for entry port.

similar to those on the piston of the steam engine, to prevent the egress of the gases at any part of the stroke. A diagrammatic section of the whole engine is shown in Fig. 3. The manufacture of the engine in the United Kingdom has been taken up by the Daimler Company, after very exhaustive tests. It has thoroughly accomplished the principal object which Mr. Knight had in view, viz., silence. It is also claimed that it is more efficient than the engine with mushroom valves. Troubles which were feared by those who had experience of engines of the kind, such as friction between the moving sleeves and the surface of the cylinder, do not appear to have materialized. It was also feared that the slots in the sleeves would be damaged, or at least partially closed, by the action of the exhaust gases on the one hand, and during explosion of the other. These fears have not been realized.

On the other hand, it is claimed, and apparently with justice, that providing the sleeves work properly, the ingress of the charge, and more particularly the egress of the exhaust gases, is more perfectly accomplished than with the mushroom valve. In the case of the exhaust, in particular, the gases are forced out through a wide opening into the exhaust tube, where, in the case of the mushroom valve, they were forced against the under side of the valve itself, and had to

find their way by a more or less tortuous path into the exhaust pipe. A similar trouble has been met with in some forms of pumps, and has been corrected in a somewhat similar manner.

The important problem of lubrication has been

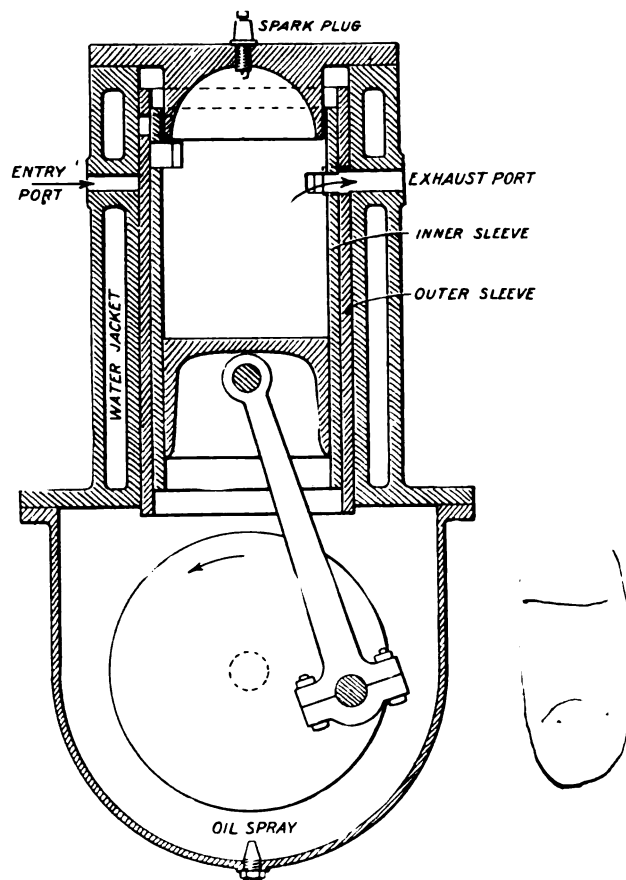


Fig. 3—Sectional view of engine cylinder, crank and slide valves.

solved in a special but apparently very efficient way. The crank chamber is closed as usual in motor engines, and right at the bottom of the chamber is a jet, through which lubricating oil is forced in a fine spray by pressure from the exhaust gases, the oil being driven up into the crank chamber over the piston, the lower ends of the sleeves and pretty well every part that is exposed. The result is that the whole of the moving surfaces are kept in perfect lubrication with a comparatively small expenditure of lubricant, the unused oil running down to the bottom of the crank chamber and being pumped out for fresh use.

Improved Combustion.

It is doubtful that fuel consumption receives the attention it merits. In conversation the other day with an owner and driver of a small runabout, he said:

"Not long ago I came to the conclusion I was using too much gasoline. On making investigation I found that my engine ran more quietly, quite as powerfully, and started better with a smaller jet and a larger choke tube than were originally fitted. These changes were made, but even then I found it would stand an enlargement of the orifices in the fixed air supply. This adjustment was made, but the gasoline consumption was still too large. I next lowered the level of the gasoline jet a little and attended carefully to compression details, and finally was able to make fully one-half more miles on a gallon of gasoline. I believe the commonest fault of combustion at high engine speeds is insufficient air supply.

THE REPAIR SHOP

BURNING OFF.

How to Prepare the Car for a Needed Repainting.

BY M. C. HILLOCK.

There comes a time in the life of the automobile when the paint and varnish structure has cracked and crumbled beyond further filling up and painting over; and the only resource is to burn off the old paint and build up new from the wood.

To do this necessitates exhaustive and careful processes, for, first of all, the painter must in this case assume all responsibility for the durability of the work. The burning off may in situations where compressed air is not to be had be done with a gasoline lamp of which there are various and excellent kinds on the market. Preferably use a 88 degrees gasoline although we have seen 77 degrees gasoline used, but it should be medium of last resort. In city establishments where insurance regulations prohibit the employment of gasoline a short hose may be attached to a gas fixture and the burning off proceeded with in that way, although, of course, it is much slower than gasoline by virtue of a lack of heat intensity.

In burning the paint do not scorch or char the wood, and in case this does occur the devitalized wood fibres should be thoroughly scraped away and the surface sandpapered down to its original live condition. In burning off all that is necessary is to soften up the paint so that with a broad, non-elastic glazing knife, held at an angle of 45 degrees, the soft pigment may be, by pushing the knife under it, clearly removed.

Begin burning off at a point on the surface where the hot pigment may be thrown across the old paint surface. Otherwise many scorched spots will develop in the wood by the hot paint falling upon it.

All the atoms of pigment should be sandpapered completely away before priming the wood after burning a primer, turpentine instead of oil should predominate. The use of 3 parts of raw linseed oil and 5 parts of turpentine, into which enough white keg lead to stain the thinning mediums should be beaten, furnishes a reliable primer for burned off surfaces. Naturally there are places upon the surface where the wood is harder and less porous than others, and such firmer textured wood refuses to absorb the amount of primer that the more open and porous wood easily swallows. The necessity, therefore, of using a primer containing a minimum quantity of oil—a quantity, in fact, that will dry if not taken into the wood at all—will be noted by the reader. Above the primer use a coat of lead broken up in 6 parts of turpentine and 2 parts raw linseed oil, with some coloring pigment to give the lead a shade or tint similar to the selected final color for the body. Brush this on smoothly with a soft point bristle brush. Allow 72 hours for the proper drying of the primer, and, if possible, a like period of time for this first lead coat, after which putty and existing surface defects with a hard drying putty made of 3 parts of dry white lead and 2 parts whiting mixed to the desired consistency in equal parts of rubbing varnish and coach japan. After 36 hours apply in successive 5 coats of roughstuff, the first coat being

made up of 5 parts white lead and 3 parts filler, by weight. Mix in equal parts of rubbing varnish and coach japan to a stiff paste, and thin to the proper brushing consistency with turpentine. Make the subsequent coats of stuff of equal parts, by weight, of filler and lead. Roughstuff should, manifestly, go to the surface heavier in body than ordinary paint coats, but there is a limit, or should be, to this. Roughstuff should be sufficiently thin to flat out perfectly smooth, with no brushy appearance whatever. This indicates a right consistency for application. It makes the rubbing out easier and develops a finer surface.

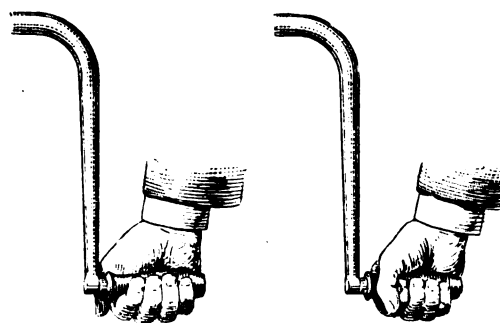
Rubbing roughstuff should always be carefully done as a means of producing not only a smooth but a perfectly level surface.

In respect to all surfacing coats, whether applied to the body or chassis, we have this to advise: Make them thin enough to flat out perfectly supple and smooth, even if it becomes necessary to employ an extra coat or two of pigment to get the required depth of foundation.

It is the burning off and surfacing details which, after all, govern the character, both in the matter of appearance and durability of the finish.

Grasping the Crank.

Although accidents from cranking are still far too frequent, they seem to be decreasing. Following are the details of a somewhat unusual one that occurred in



Right Way.

Wrong Way.

East Orange, N. J., whereby a 2,500 pound car ran over the body of a physician, and he yet lives comfortably to tell the tale, with no broken bones, but feeling just a little stiff "in his midst." It appears that the doctor brought his engine to low speed and ran his engine so slowly that it stopped. Without throwing it out of gear he stepped in front of the car and began to crank the engine. As soon as the machine started the car started with it and the doctor had to scramble not only to get out of the way, but also to climb aboard again and assume the guidance of the mechanism. He leaped to the left side of the car, and as the mud guard passed him he made a grab to swing aboard. His foot slipped, and under the wheel he went. After the car went over him he lay there stunned for a moment, while the car went on for nearly a block before his wife, who sat in the rear seat, could reach out and jam on the brakes. The other occupants were guests, neither of whom was familiar enough with the working of the machine to be of any assistance.

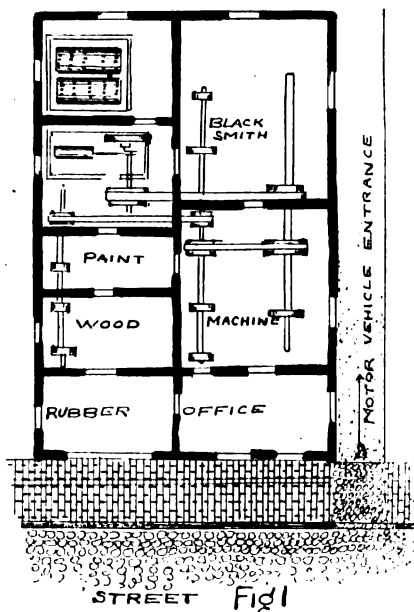
Most accidents from cranking are due to the crank

suddenly flying backwards before the hand can be relinquished, and this usually results in a broken or strained arm or wrist. These accidents are now comparatively rare, but they might be avoided altogether if the crank handle were grasped, as in Fig. 1, and under no circumstances as in Fig. 2.

MODERN REPAIR SHOPS.

Some Suggestions as to Departments and Their Scope.

One who has travelled very much among the automobile repair and construction shops cannot but marvel at the progress which has been made during the past ten years. A dozen years ago the automobile shops in which repairs could be made were quite few. The bicycle repair men got some of the work, the blacksmiths and the machinists some, and the livery stable men did a little business on the side hauling broken down machines to the local shops. But this is different now. There are what the automobile repairing engineers term system at repair shops. For-

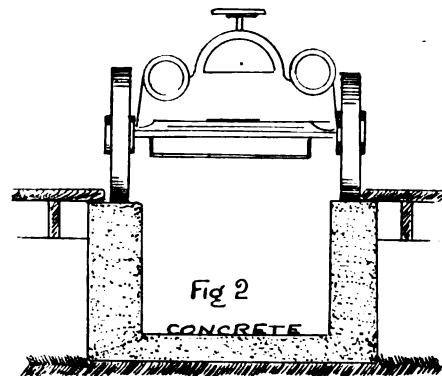


merly the repair shop meant a place in which there was a vise, a forge, a bench, a drill and some tools with which to work. To-day the better class of automobile repair shops involve a system of departments in which all of the work of repairing and building can be conducted. There are shops in which metals can be cast. There are some in which the work has progressed to the turning down of studs and other parts of the modern automobile.

In this article, however, we refer chiefly to the practical, every day system of repair shops appertaining to the modern motor vehicle, whether the vehicle be for passengers, mail traffic, express or heavy teaming. The modern repair shop is equipped for handling any part of any machine that may break down.

Fig. 1 will give a general idea of the ground plan of a shop of this description. There the reader will find an outline of the arrangement of the various departments forming the system. Starting at the back, there is the electric plant or the boilers and engine. Power is generated here for distribution throughout the departments, for the reason that in the up-to-date works of this nature, very much of the mechanical work is accomplished by power machinery. The blacksmith shop is quite an institution in the modern auto-

mobile repair shop. The writer recollects the time when the forging of metals and all of the blacksmithing work for the average repair shop was done either by some of the machinists or on the outside. This was a very unsatisfactory way of getting anything

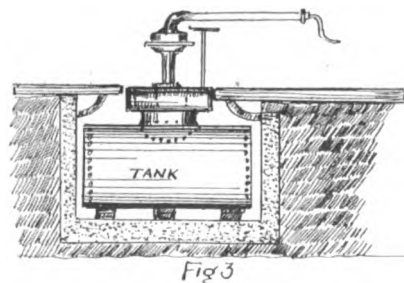


done promptly and uniformly. Consequently the system of repair shops include a blacksmith department which is in charge of a man who is skilled in his particular branch of the service. He knows little about rubber and enamelling, for there is a foreman in the other rooms to attend to that line of work.

The modern system of repair shops includes a paint room. This was thought quite unnecessary until a few years ago. The painting, if any was done, was bid for on the outside. A finished piece of repair work had to wait until the convenience of the painter to complete the work so that the car could go out. You will find well equipped paint rooms in many of the up-to-date systems of repair shops now. So will you observe a woodworking branch. This department, too, was thought quite useless in the beginning. In the wire wheel day there were not many wooden spokes of wheels wanted. But there is a great deal of work in the wooden hub and spoke line at present.

Then there is the woodwork of the body of the vehicle. There is wood stock and machinery to work it, for there are quite a number of wooden devices in connection with the modern automobile, all of which require more or less repairing as time progresses.

The machine shop proper is arranged in the general



plan as indicated in the diagram. Here we find the usual complement of machinery and tools as of old. This department does not differ much in the system of repair shops from what it used to be, for the reason that it was, as a rule, quite well furnished with lathes, drills, and different machines and tools.

The rubber room always has been, but not as it is now. The back room, or a closet side of the office, or a shed or attic answered all purposes. Now there are special rubber rooms in which are show cases and counters, so that tires and in fact all kinds of rubber automobile goods may be placed on sale. There is a good profit in handling rubber clothing and other

articles needed by the tourists, and in fact all kinds of accessories.

The office is located in front, as shown.

The introduction of concrete has helped automobile repair service. In some repair shops I noticed excavations in the floor large enough for working below the machine.

One is shown in Fig. 2. The concrete walls and bottom make a very convenient place to work in, and in this way you can get at the bottom of the car in good form.

First-class repair shops includes a gasoline tank, and Fig. 3 shows one man's method of safety. The tank is protected with a concrete wall and bottom. The supply pipe terminates in a rubber tube, and this tube is connected with the tank of the car. A force pump sucks the gasoline from the tank to the tank of the automobile. Quite a revenue is obtained by gasoline sales.

One Way to Remove Dents.

An English exchange recommends the following methods of removing dents in hollow-metal articles: If the tank of a radiator is indented, a loop should be



Fig. 1.

made in a piece of stout brass, or bright steel wire, bent at right angles, as at A in Fig. 1, and soldered to the lowest part of the dent. A larger loop should then be made in the other end of the wire, and with the aid of a lever and a block of wood resting on the tank to form a fulcrum so as to dispose the force of the pull on the lever over a fairly wide area, the dented surface can easily be pulled flush with the rest of the

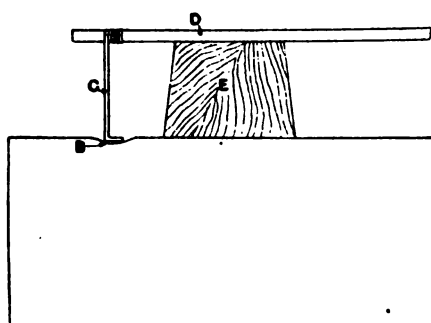


Fig. 2.

tank surface. Dents in head lamps and other small articles can be taken out in a similar manner, though in place of the lever a strong cord should be attached to the wire loop and its free end fastened to a vise or any convenient anchorage. In Fig. 2, B is the wire loop, C is the wire, D the lever, and E the block of wood.

Fig. 3 shows a sketch of a horn under treatment. The horn is grasped in the hands, and a few gentle jerks will remove the dent. The wire loop in both cases can easily be removed by means of a blow lamp or a soldering iron. No doubt more elaborate methods can be resorted to for this sort of work, but probably the above method is as quick as any, for a piece of wire can be bent to any shape to suit the job under consideration. No tools of any value are necessary, and

such as are used, viz., a piece of stout wire and a soldering iron, can be found in almost any house. Of course, if the dented article is made of too strong a gauge of metal something stronger, such as a back

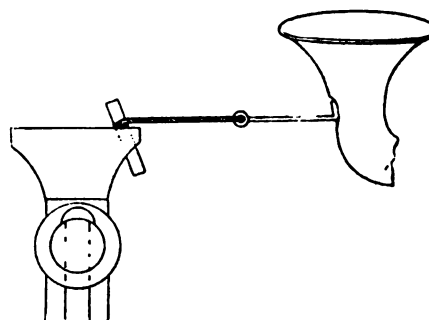


Fig. 3.

cable socket, must be used for soldering in for the hollow or dent.

Worn Cylinder Bores.

When a car that has seen much wear is overhauled an enlargement of the cylinder bore usually means an expensive item in the repair bill. The wear is found high up in the cylinders, the bore of the cylinders at their base remaining as it originally was. Some repair men are content to fit new piston rings of slightly larger circumference, but this plan is not wholly satisfactory, as the rings are compelled to be small enough to enter the unworn portion of the bore, and when they spring out in the worn portion, where their work lies, there is necessarily too large a gap at their slots. Thus repairers prefer to fit new cylinders and new pistons whenever the customer will sanction the outlay. This outlay is none the less unnecessary, even when the wear of the bore amounts to 2 millimeters measured diametrically, as it often does in old cars. If the new rings be made with long step cut ends, they will pass the unworn bore easily, and yet there will be no gap at their ends when they spring out in the enlarged bore. One precaution is, however, essential. The grooves on the existing piston are usually too narrow to take step cut rings, and the rings will soon snap off at the steps. The grooves must, therefore, first be turned out to a greater width, and the new rings turned to fit. Full compression is thus restored.

Start Nuts Carefully.

If difficulty is found in causing a bolt holding together two parts to fit their holes with ease, the chances are that the two pieces are displaced angularly, and it should not be attempted to put the bolt in place by brute force. The condition should be examined and rectified if found wrong. A great many bolts and studs and their nuts are damaged by carelessness in starting the nuts cross threaded, and then using a wrench forcibly to turn them on. Nuts should be started carefully with the fingers, and one should be certain that the threads "take" properly.

Burred Bolts.

Bolts are very often spoiled in driving them out from the parts in which they are located. If they do not start readily one is often tempted to use the hammer upon them, with the result that the ends of the threads are frequently burred over. A stick of hard wood, is still better, vulcanized fiber, used between the hammer and the bolt will prevent damage of this kind.

Useful for Power.

It is a well known fact that the motor of an automobile can be operated without moving the carriage. In this connection, if one lives in a sheep district and happens to own a gasoline runabout, he can shear sheep to good advantage.

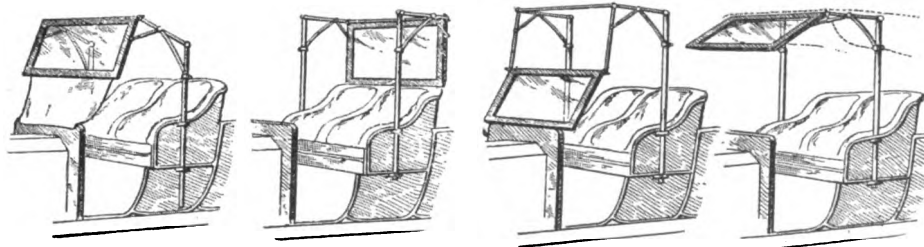
Simply buy the parts of two sheep shearing machines, or, in other words, get two clipper heads and long flexible shafts, and drive both from one pulley by means of a belt on the motor fly-wheel. The details may vary somewhat with different types of motors.

When shearing time comes, take a man with you and drive to the sheep farms. On arrival put on belt, oil up and you are ready for business. Carry an extra set of knives and sharpener. An extra clipper head for horses might also come in handy. In this manner two men can shear more sheep than a dozen can in the old way and do it better, for you get all of the wool and cannot cut the sheep.

When the farmer owns an auto—well, he should make it do his washing, saw wood, cut feed, or, in fact, do any work that an engine is supposed to do.

A New Wind Shield.

The illustration shows a wind shield that is coming into use on many of the cars abroad. Four positions



are shown and its advantages seem to be mainly in its adjustability. It is here illustrated more for the novelty of the idea than that it will be likely to come into general use.

Noisy Valves.

If an exhaust valve spring be weak, unnecessary noise will occur, in addition to loss of power, for two or three reasons. When the engine is "throttled down" and running slowly the valve will be lifted slightly by the partial vacuum which occurs in the cylinder on the induction stroke, and causing more noise in the aggregate by making the sound of closing twice in rapid succession.

When the engine is running fast with a weak spring, again two sounds are made—in this case the sound of the tappet falling on the cam and then that of the valve coming to its seating.

If it is thought that a weak spring is the cause of excessive noise, the correctness or otherwise of the theory can be ascertained by helping the action of the spring by hand or with some instrument, such as a screwdriver, exerting a downward pressure on the valve spring cup while the engine is running and listening for any difference in the sound as compared with that when the spring is unassisted.

Springs to "recall" the tappets are not fitted on all makes of engines, and the practice of omitting these is a mistake, for a considerably stronger valve spring is then necessary for the extra work of overcoming the inertia of the tappet. This stronger spring, of

course, puts more strain on the neck of the valve, with greater liability for breakages at this point.

Of course, noisy valves are due to other and more frequent causes, the foregoing being simply one that has not frequently been noted. Among the other causes of noisy valves are too much strength of the spring and the clearance between the valve stem and the head of the valve.

A Choked Carburetter Jet.

When a motorist is in a great hurry, and afflicted with a somewhat inaccessible jet, which is choked up with dirt so that no gasoline is being sprayed through, it is useful to know of a simple expedient which allows the car to take the road again within five minutes. This combination of circumstances recently attacked me on a car fitted with that old pattern carburetter possessing a rose jet, and so assembled that the inlet pipes had to be taken off before the jet could be exposed. I utilized a dodge learned during a similar experience when the key for the jet had been omitted from the kit and the exposed rose could not be unscrewed. Ignoring the jet altogether, I injected about a teaspoonful of gasoline into each cylinder, closed the petcocks, and started the engine on the few drops of spirit which I had just injected. The instant the engine fired, I advanced the spark lever. For a moment

our fate trembled in the balance, and the engine, having exhausted the injected spirit, seemed on the verge of stopping; just as it reached what promised to be its last kick, the fierce suction dragged out the obstruction from the jet, and it roared away into its full pace again. It was left running for a couple of minutes with the accelerator pedal down and the spark fully advanced, and the suction cleared away the foreign matter so completely that there has been no need to dismantle the carburetter at all.

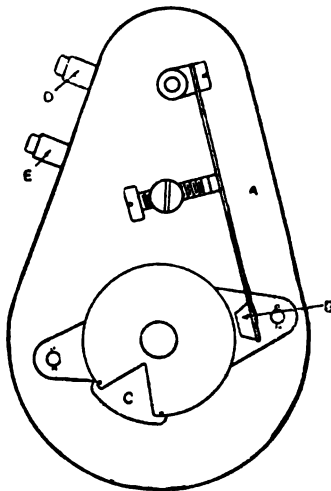
For Leaky Radiators.

As to leaky radiators, when they leak badly the only remedy is to get new ones or send them to the makers and have them repaired. In the case of small leaks, to attempt to repair them by soldering often results in leaks somewhere else. But as a makeshift in the case of a radiator that "weeps" along the edge of the cells, a thin mixture of fine oatmeal may answer temporarily, but it should be as fine as it can be got. Two tablespoonfuls of flour should be put in a jug, damped slightly, and mixed into a smooth paste absolutely free from any lumps. More water can then be added till the jug is full, and the whole mixture can then be poured into the radiator. It will be found that the flour, which will do no harm to the pump or any part of the circulatory system, will gradually work into the leakages of the radiator and stop them up, so that after two or three days' use the leakage will be entirely cured. The one objection to this remedy is that it is impossible to prescribe it as a certain one. There is no

definition for the size of the cracks it will seal, but it will certainly stop leaks which are sufficiently serious to weep slightly when the radiator is warm, and which consequently leak worse when it is cold. After all, if the application fail no harm has been done.

A Cheap Wipe Contact.

Once understood some of the old pattern vibrators prove an admirable contact breaker, but as there are some motorists who never seem able to get the hang of it, particulars of a simple transformation to a wipe contact may be of interest. One wire from the coil goes to the upper of the two insulated terminals on the contact breaker, and the other terminal



A, platinum screw, acting as stop for blade B.
B, blade with truncated wedge piece attached.
C, steel contact mortised in notch.
D, wire to coil.
E, disused terminal.

is disused, the remaining wire from coil going to earth in the usual way. The vibrator blade serves as a wiping brush, half of the triangular boss on it being ground off to afford a good wipe. The cam is then removed from its shaft, and a triangular piece of steel having an arc for its base instead of a straight line, is mortised into the notch of the cam, projecting $\frac{1}{8}$ in. over the circumference of the cam. The original platinum screw is then adjusted to act as a stop stud, to hold the blade out of contact with the circumference of the cam, yet not so far from it that it does not press against the mortised insert of steel. This contact is not subject to wear, however far it may be run, and there is no jumping of the blade when the steel insert hits it, as one might expect. The writer was very proud of the notion, but after fitting it up was troubled with misfiring, and almost scrapped it, under the impression there must be a jumpiness about the contact which his eye could not discern. Finally it occurred to him that the earth through the camshaft was a bad one, and on fitting a wire to earth his troubles ceased. The earth wire being untidy, he finally again removed the cam and slipped two or three coils of an old inlet valve spring on to the shaft behind the cam. This is still in situ, never having been disturbed, and there has been no misfiring whatever since it was fitted.

Engine Running.

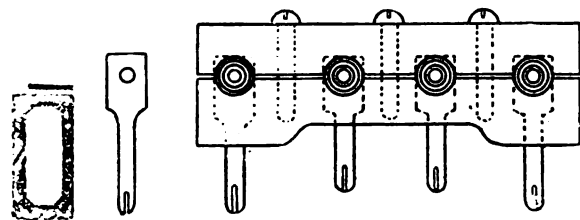
Always remember that any useless revolutions of the engine—that is, when the engine is running light, are so many moments less life to its existence. It is an unnecessary cost of gasoline, lubricating oil and wear and tear—a noise, a discomfort and an irritation to people and mechanism.

For Internal Expanding Brakes.

Recently in the middle of long trips the cast iron segments which form the internal expanding portion of the side brakes gave out completely. The brakes were needed down a long hill, and when applied lost their retarding effect altogether before the bottom was reached. Examination proved that though the cam which actuated them was perfect, the shoes themselves had lost so much of their original contour that when fully expanded they barely touched the rim of their hollow drum. The car was a long way from a good repairer's or a decent hotel, and even if we could safely reach a comfortable stopping place the delay in obtaining new parts would have compelled us to take the car home by train. We ran on some miles on the foot brake alone, using the bottom gear down all unknown hills, until at last we found a shop where we were able to procure some soft strip zinc, about $1\frac{1}{2}$ inches wide. We lined the space between the inner rim of the drum and the worn shoes with this metal, and found the brakes were restored to power, while a cross bar of the brake operating mechanism made it impossible for the impromptu lining to edge its way out; in fact, it was rather a job to get it in. We first meditated wrapping the actuating cam with the strip zinc, but a little reflection showed that this method would throw a very eccentric strain on a limited arc of the drum's circumference, with the probable result of making new drums necessary as well as shoes.

Fitting Magnetos.

Many owners of old pattern small cars find that ninety per cent. of their road stoppages, whether of the absolutely compulsory or voluntary adjustment order, have to do with ignition defects, and as most magnetos can be relied upon to run an engine several thousand miles with no other attention than lubrication, it is generally worth while to fit a magneto. Sometimes repair men cast a hasty glance over your old style car and say it is impossible to fit a magneto to it. As a matter of fact, nothing is easier, and the expense in the case of a single-cylinder need not be much and this will soon be recouped, as accumulator charging, new platinums, etc., disappear from the up-



keep bills. The camshaft has usually sufficient bearing to carry a small driving sprocket. There is always room to bolt a light horizontal platform with struts on to the crank case. Four elliptical slots are cut in this, through which the holding down studs of the magneto project, being secured below with nuts, and affording a means of chain adjustment. Then another sprocket is mounted on the armature-shaft, a cycle chain used for driving the armature, and lubrication is the only difficulty remaining. This may be expensively met by having aluminum chain cases specially cast by a good firm of aluminum foundries. Recently a car was seen on which the oiling was most cheaply managed. It was the property of a mechanic, and he had mounted an old cocoa tin on a bracket screwed to the crank case. In the bottom of the tin he had soldered a bit of tubing in which a half-inch

round wick was a tight fit. The wick simply rubbed on the magneto chain, and the tin was kept full of oil, while its original lid prevented splashing! It looked a horrible makeshift, but it worked admirably, and his last couple of thousand miles had been covered without a road stop, while he claimed that the new ignition had increased his power!

Shuts the Wrong Way.

A reader refers to the annoyance he was subjected to by an ill-designed lubricating cock, which was shut with the handle horizontal, and if accidentally opened—as, for instance, in cleaning—permitted the entire contents of the oil tank to flood the crank case. There are an astonishing number of these crudely designed pump and tank arrangements, and as any mechanic can set them right in half an hour, particulars may be of interest. The nut and cotter are removed from the taper end of the tap and the barrel withdrawn. A pin is then soldered into the cross channel. Any projecting ends should then be turned down flush on the lathe, and a fresh channel drilled through at right angles to the original passage; the tap is then put back with the stop pawl replaced differently on the squared part of the tap barrel, so as to stop the turning in the correct positions. The tap is thereafter closed in its downward position, to which any accidental touch or shock will naturally send it, and yet, owing to the spring, there is no fear of its closing without the owner's knowledge during running.

Cork Inserts.

If afflicted with a leather clutch of the plain cone variety, rather inaccessibly situated, and destitute of any adjustment whatsoever, try experiment of having cork inserts fitted thereto. In one case clutch was converted as described nearly two years ago, and has since then been on the road almost daily. In this period it has never once shown the faintest tendency to slip, though previous to the conversion it required releathering every 800 to 1,000 miles. If not attended to, it would now be permanently fierce, but every evening it receives a drop or two of thick oil, and this, in conjunction with the cork studs, keeps it in magnificent order. The cost of the cork inserts appears extravagant at first sight, but with results like these they cannot be called expensive.

Wire Ropes for the Brakes.

If the side brakes are actuated by a wire rope, keep a lookout now and again at the places where the wire rounds a bend, or anywhere it is liable to chafe. These wires, after a strand or two has gone, soon go altogether, and to suddenly find the side brake useless is most disconcerting, more particularly as a roadside repair is not particularly easy.

A Tire Shoe Puncture.

In the case of a nail puncture in a tire shoe, the hole made should be covered by sticking a bit of prepared canvas to the inside of the casing to prevent grit and water from working in between the inner tube and the cover.

You should remember that changing the tire often affects the wheel diameter and may thus make a difference with the reading of the speed indicator.

When you want to extinguish your lamp, open the door and blow out the flame. This leaves the wick in the right place for the next lighting.

Causes of Tire Troubles.

The Continental Tire Company having kept careful record of the causes of injury to shoes and tubes brought in for repairs during a given period finds that they are as follows:

SHOES.

- 17.3 per cent. in consequence of insufficient inflation.
- 3.5 per cent. in consequence of rusty and dented rims.
- 1.5 per cent. in consequence of cutting off of cover pad through inadequate fastening of butterfly screw, whereby the cover could shift on the rim.
- 1.8 per cent. in consequence of sudden braking, which scoured through tire at one place.
- .2 per cent. in consequence of contact with oil or other fatty substances, which are known to decompose rubber.
- 29.4 per cent. in consequence of perforation by nails, stones and pieces of iron.
- 4.3 per cent. in consequence of light damages and cuts on the threads, easily repaired.
- 4.9 per cent. in consequence of considerable outer damages, whereby the upper canvas layers were destroyed.
- 37.1 per cent. in consequence of normal wear and tear.

100

TUBES.

- 13.0 Per cent nipped in mounting.
- 7.2 per cent. places scoured through in consequence of defective mounting or the presence of sand and small stones in tire.
- 9.5 per cent. through defective mounting.
- 6.8 per cent. through riding on deflated tubes.
- 5.8 per cent. damages through defective and wrong cover holders.
- 10.0 per cent. valve defects through wrong manipulation of valve.
- 43.7 per cent. normal wear and tear.

100

From which it can be seen that a large proportion of damage to shoes and tubes must be placed at the door of the car driver himself.

Advantage of Lightness.

Other qualities being equal, lightness is an excellence, and is eminently desirable. It is no use sheltering under the assertion that light machinery may be flimsy, or is unreliable. If it is, then "other qualities are not equal." But lightness is very difficult to get; it requires skill, brains, good workmanship, scientific knowledge, careful experimenting, and the very finest materials, with careful testing of all metal. This will have two results. At the outset, lightness is expensive; later, when the machinery is set up and the design simplified, it makes for economy. Certainly it makes for liveliness, which is both a desirable, and, what is perhaps more important, a very saleable advantage. If one designer can show superior lightness in any part without laying himself open to any well-founded charge of flimsiness in that part, the sooner everyone else learns how light that part may safely be made the better.

If a car weighs 2,000 pounds carries four passengers, if the weight can be reduced 200 pounds and not injure its quality, it can carry another passenger, can't it? And if it can be made to carry five passengers instead of four its capacity and value will be increased one-fifth, will it not?

TRouble DEPARTMENT.

Questions answered by the Y. M. C. A. Automobile School, 322 West 57th St., New York.

This department is intended to be a "trouble clearing house," and it will be esteemed a favor if our readers will add information to it from their own experience or knowledge.

The Sparking System.

Question:—I wish someone would explain the sparking system in your magazine, such as the advantage of the sparking lever. Why does it increase speed? Does it give a hotter spark? Some time ago my machine got so I could not advance the lever more than about three inches, same as I used on pulling a hill. If I advanced it further, the cylinder would knock, even on level roads. If I wanted to increase speed, I would have to use my gasoline lever. I met a good machinist one day in his car and asked him what could be the matter, but he could not give me any information. One day I took the commutator off, washed it with gasoline, oiled it, put it on, and the machine worked as good as new. What could have been the trouble?

Answer:—The spark control lever does not affect the temperature of the spark. When the spark control lever is retarded the spark does not occur until the piston has travelled part way out of the cylinder as the pressure of the expanding gas is not applied for the full length of the stroke the engine has not power enough to run at a high rate of speed. When the spark control lever is advanced the spark occurs when the piston is just beginning to travel out of the cylinder and pressure being applied the full length of the stroke, greater power and consequently greater speed is obtained.

If a commutator is not kept lubricated, the metal parts will wear and form a continuous ring of metal particles around the inside surface. This will make the primary circuit complete before the moving finger of the commutator has touched the real contact point. This causes the spark to occur in the cylinder before the piston has reached the top and before the crank has passed the dead center point, which puts a pressure on the crank tending to push it backwards. The fly-wheel has momentum enough to keep it going forward, but the two forces acting opposite to each other cause a knock in the engine. When you washed out the commutator I think you removed these metal particles which overcame the difficulty.

Trouble with Lubrication.

Question:—I wish to ask how to overcome the difficulty of grease on the brakes. I suppose it comes from the differential gear. Am I right or not, and how do you overcome it?

I also wish to know how to stop the carburetor from leaking when I prime it to start the engine.

I have a Winton X. I. V., manufactured in 1907.

Answer:—Grease on the brakes is, no doubt, due to leakage from the differential housing, which will occur if too much oil is placed in it, or if the oil used is not heavy enough. A very heavy oil should be used and only enough to allow the gears to dip in it.

It is quite natural for a carburetor to leak after being primed, as the carburetor is primed for the purpose of flooding the float chamber. This excess gasoline goes through the span nozzle into the combustion chamber and from there to the ground through a hole provided for it. If, however, the flooding continues for some time after priming, take the carburetor apart and ex-

amine the float, as it probably sticks and holds the supply valve open.

On Power Increase.

Question:—I have a two-cylinder Mitchell runabout and it doesn't give power enough on hills. I have been wondering if it would give power enough if I got a new crank shaft, shorter piston heads, and rebore the cylinders and get a longer stroke that it has now. If I lengthen the stroke one-half inch, how much more power would it give me than what I have now? I need about three-horse power more than I have now. I will be pleased with your answer.

Answer:—As the Mitchell Motor Company make two-cylinder motors of different bores and strokes, and as you do not state the bore and stroke of your particular motor, we find it impossible to give you a satisfactory answer. Lengthening the stroke of the engine would give more horse-power, but a one-half inch lengthening would not give three horse-power more to an engine that develops eight and ten horse-power as the Mitchell motors do.

Grades of Gasoline.

Question:—Is there much difference in the grades of gasoline? Should a person keep a tester with him? Does the highest degree give the best results in automobiles?

Answer:—Unfortunately there is not much difference in the grades of gasoline that can be procured at the present day. It is all more or less bad. This is because of the great quantity that is now being used for automobile fuel. In distilling the petroleum from which gasoline is produced, a greater quantity is possible if the quality is sacrificed, and this is done and must be done in order to supply the great demand for gasoline. Generally speaking the highest degree test is best for automobile use. It is tested with a Baume hydrometer and should register between 68 and 76 degrees, that which test 76 degrees being the best for automobile use. These hydrometers can be procured for very little cost, but would be of little use unless you had facilities for distilling the petroleum yourself.

Lacks Power and Speed.

Question:—I would like to ask for information through your valuable paper, if I have the privilege.

I have a single cylinder Cadillac, which has been run about two and a half years and is in good condition. It has extra good compressions, but when thrown in high speed does not seem to have the power or the speed it once had. It does not seem to pick up as it should, and it cannot start in high speed at all if the least bit up grade. Can go any place in the low gear. To advance the spark does not seem to have much effect on speed. Now, I have done all I know to do, and don't like to take it to the repair shop, as I don't think there is very much the matter with it, and it is considered that automobile owners are easy marks. Know I would get picked.

Answer:—From your description we would judge the trouble to be with the carburetor. Carburetors that are adjusted correctly in warm weather nearly always need readjusting when the weather becomes cold, unless they have some attachment for obtaining warm air. Cadillac cars have no such attachment, therefore we believe that the gasoline does not vaporize properly and the mixture is not correct. The remedy will be to increase the percentage of gasoline in the

mixture. On the top of the carburetor will be found a small bolt which presses against a flat spring. Turn this bolt slightly to decrease the tension on the spring. If this improves the running of the car, continue turning the bolt until the car runs at its best.

Spark Plugs.

From Walter E. Smith, New York.—Kindly inform me in the Question and Answer columns of the Auto D. & R. if it is necessary to have the spark plugs (on really iron studs) tipped with platinum of the make and break system for a proper ignition or contact and what steps should I take to have it so.

Answer.—The general practice is to use iridium points on make and break spark plugs, platinum being so soft that it will not stand the hammering, although on some of the highest priced cars steel points are used.

Where iridium points are used the life of the contacts is prolonged, but the size of the spark is diminished and it is on this account that on some of the higher horse power motors steel points are used. We feel that steel points will give you good satisfaction and they can be put on at any good machine shop. If, however, you prefer the iridium points we would advise exchanging your old plugs for new ones. This the manufacturers of your car will gladly do, charging only the price of the iridium.

Two and Four-Cycle Engines.

Question: I want to get an automobile and wish you would tell me the comparative merits of the 2 and 4-cycle engines.

Answer: The merit of the 2-cycle engine is principally in its simplicity. It does not have the inlet and exhaust valves, the cam shaft and other apparatus necessary to operate them, that is found in the 4-cycle engine. This fact also renders the engine less noisy than the 4-cycle type because every down stroke of the piston is a power stroke as against every second down stroke in the 4-cycle type, a more even torque is maintained on the crank shaft which should lessen vibration and give better results for heavy work. On the other hand a 2-cycle engine will consume about 30 per cent. more gasoline than a 4-cycle engine in doing the same amount of work. It is not so flexible as the 4-cycle type because it does not run well at a very low speed and is unable to reach a very high speed. Thus, against simplicity in the 2-cycle engine, we have less fuel consumption and greater flexibility in the 4-cycle engine.

Sprockets and Chains.

From C. W. Voories, M.D., Wisconsin.—In your January issue you answered a question concerning change of power, by stating that if the car in question is chain driven it would be a simple matter to exchange the driving sprocket for a smaller size. I think it would be almost as easy to get a new gear. Frequently one can be found in some of the garages that costs but little. If one be used that is just a little smaller it will greatly increase the hill climbing power and lessen speed. The Stoddard-Dayton manufacturers are doing this in their 1909 cars.

For Heating and Pounding.

From W. N. Bailey, Wisconsin.—I have run a car but one season, but I have read much on engines heating and pounding. I had those same troubles, and could find no cause for it, for everything seemed to be all right, so I decided that it must be carbon. Finally

when I came in at night after a ride I squirted into the hot cylinders a little kerosene, and my trouble soon disappeared. I continued the use of the kerosene and last fall when I put my car up for the winter I took my engines apart and found hardly any carbon in them.

If there is any reason why kerosene should not be used in this way I wish some one would tell me.

Water and Air-Cooled Engines.

From O. H. Hampton, Indiana.—We note a recent inquiry from one of your Kansas correspondents who wants to know the comparative merits and demerits of water cooled and air cooled automobile engines.

The water cooled engine cannot deliver as much power from a given amount of gasoline as the air cooled engine does, for the reason that gases are expansive, (and proportionately powerful) in exact proportion to their temperature. The hotter they are, the stronger their expansion. It is impracticable to have the cylinders of a water cooled engine much above 212 degrees because water boils at that temperature. In the air cooled engine the temperature can be kept a good ways above 212 degrees; the only limit is to have the cylinders below the point at which they would ignite the gas as soon as it reaches the cylinder, and also they must not be hot enough to decompose the oil used to lubricate the pistons. The only question is, can air cooled engines be kept cool enough? From experience, the writer knows that there is no trouble about it so far as two cylinder four cycle motors are concerned. He has driven a motor of that type sixty miles without a stop, giving it all the gasoline it could use and the weather was at 90 above while the trip was made, and there was no over heating. He has driven the same vehicle 5,000 miles and there has never been the least trouble about over heating.

It all depends on two things. Proper fanning of the cylinders and the use of a suitable oil. A fly wheel eighteen inches in diameter with properly designed fan spokes is all that is needed for the cooling.

Care must be taken to have an oil that will stand a high degree of heat, or there will be trouble. Some oils that are excellent for water cooled engines will not do at all for the air cooled ones. There are a number of oils on the market, and perhaps most of them are good, but the only safe way to do in the matter of oil is to use the kind and brand selected by the maker of a bicycle tire of that day and considered its cubic air capacity as compared with the weight it carried. Ignoring for a moment the fact that the automobile tire had greater strains from speed and from the twisting action of four wheels, as against two, he found that the tire sizes then recommended did not carry a proportional volume of air, and it was this point that started him along the line of ordering and paying for the bigger tires.

Another Steam Advocate.

From Otto F. Frengel, Ohio.—The discussion going on concerning the merits of steel and gasoline cars has been very interesting. I would like to say that my father bought a White steam car, 1904 model, in the latter part of August, 1908. It has given the best of satisfaction. The car was purchased one day in Cleveland, Ohio, and the next day at noon my father, a representative from the company and myself, started for Crestline. The route we took made the distance about 125 miles, and was accomplished in seven hours, although time was taken for two of us to learn to drive

the car. One stop was made for gasoline, and a stop of about three-quarters of an hour was made for dinner. I drove the car at the rate of thirty-two miles an hour, on my first trial at the wheel. So you see a steam car is not hard to manage.

The car has thus far been driven something over three hundred miles, not including the trip from Cleveland here. The repair bill has been but ninety cents, for having an inner tube mended. The gasoline consumed is not known, but we are sure that it requires not less than one gallon to ten miles on the average. On ordinary roads the reverse lever can be set one or two notches ahead, thus using more expansion, and economizing in gasoline and water, as well as power.

I have driven our car up and down a certain sandy hill three times without any trouble whatever, and a great many with gasoline cars prefer to go around it. Except in the case of Mr. Glover, who had something published in your magazine some time ago, I never heard of anyone parting with a steam car for a gasoline car. I have, however, heard of several turning away from a gasoline car for a steamer.

I am well acquainted with steam power, being an

and clamped in position by a separate section of vulcanite secured to the main portion of the "jack" by three screws. One lifts all the wires away together when the "jack" is removed, and a mistake cannot be made when replacing them, for they all go back together in their correct sequence. There is no "pull" on the wires, all this being taken by the insulation.

A Cryptogram.

There has been received at this office a communication, presumably from some one of our friendly readers, and written on a postal card, which neither the individual nor concerted efforts of the editorial and business staff can decipher. As it bears no signature, there seems to be no way out of the difficulty except to have a reproduction in facsimile made of it and to submit it for interpretation to our readers. To provide an incentive for this we take pleasure in offering, as a mark of our appreciation of the talent it will require, an honorarium of \$2.00 to the first who will send in a correct and full transcription of it. First come, first served. The cryptogram facsimile follows:

This is no Collis fraction
Known to doctor. In Collis
fraction there is no fraction
of the value. This way of
thing makes impression in
your very sure way of dis-
cussing other things. You run
1000 to 1 minutes to the inch
of grass plus minutes.

engineer, but would never part with a steam engine for a gasoline engine, whether in the case of an automobile, a factory or on the farm. Here on our farm we have a stationary steam engine, and a boiler, which we find very economical, as you can burn in it much useless trash, and it serves a good purpose in preparing food for the stock, heating, etc. It seems to me that a gasoline engine is a good deal like hitting the piston with a sledge hammer. When it comes to a stiff long pull the steam is far ahead.

A Useful Kink.

From Charles Woods, Michigan.—I have on my car an arrangement which I consider far better than single plug terminals, for even if the latter are marked in some way it is always difficult to distinguish which is which when oil, grease, etc., have done their work.

I have made what I call a "jack"—a single piece of vulcanite shaped to fit the top of the magneto distributor. This is fitted with four brass pegs about 2 inches long with an inch or so protruding from the bottom. These protruding ends fit into the sockets on the distributor, and the four wires are brought to the top of the "jack," and into contact with and threaded through a hole in the embedded plugs, being held

Rubber Matting.

When the rubber matting on motor cars has been in use for a time its uniform color disappears, the oil and grease collecting upon it from boots and by dripping tending to rot and discolor it. To prevent the destruction and discoloration the matting should be painted, with lead colored paint, which, when dry gives a varnished surface. Not only is this oilproof, but it gives a bright look to the mat, and renders it easily cleaned by means of a cloth.

To Clean Aluminum.

Go over the surface with a solution of from five to eight parts of water to one of sulphuric acid, using a stiff bristle brush. Afterward remove the excess acid with water. Make a mixture of fine emory and turpentine and apply it to the surface with a bristle brush. A vigorous rubbing will restore the metal to its original appearance.

Of Great Value.

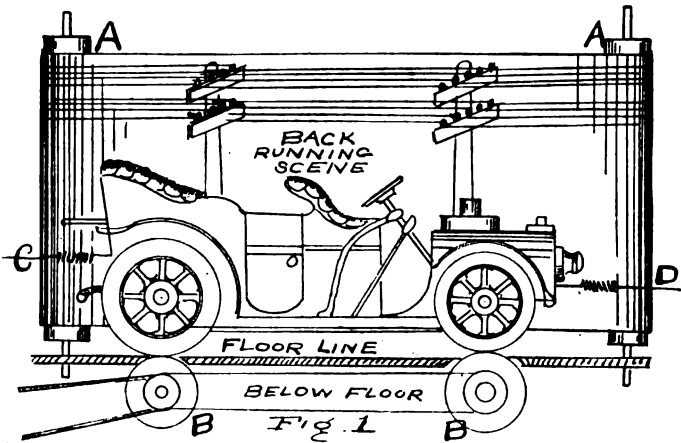
From A. M. Karus & Son, Pennsylvania.—We must admit that your magazine has been of great value to us, and we would not discontinue it for twice what it costs. We therefore wish you great success.



EFFECT OF MOVING.

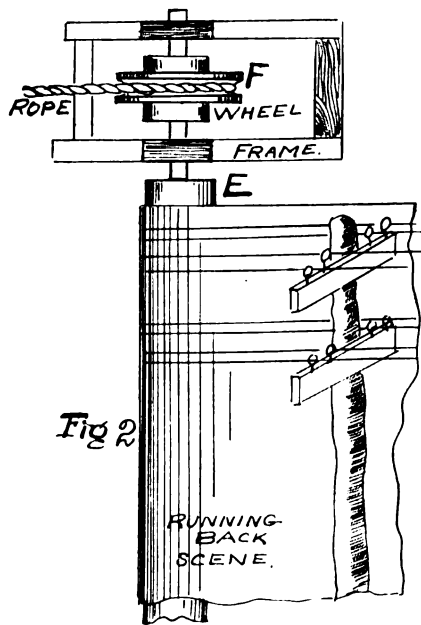
How to Have an Apparently Running Car in the Sales Room Window.

Fig. 1 shows the plan of construction for presenting what is apparently a running automobile in the show window of an automobile salesroom. First, the machine is placed in the window and centered. Then the floor below each wheel is cut out so that a revolving



A Moving Car Scene.

drum, B, B, can be put in. There may be four drums of narrow proportions used, one for each wheel, or two long drums of equal diameter, one for each pair of wheels. In the first instance, the carpenter cuts four small openings in the floor, in the second two large

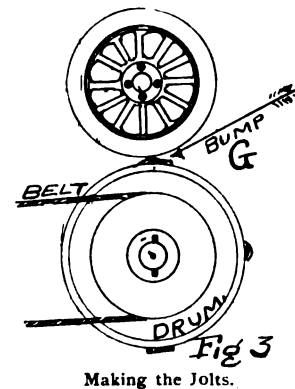


How It Works.

ones. The drums ought to be about half the diameter of the automobile wheels. The drums should be wide enough so as to give the car wheels ample running room. A very exact imitation of the running of a machine of an average rough road may be obtained by tacking a few cleats on the drum surfaces.

After the holes are cut in the show window floor, or wherever it is desired to exhibit the representation of a running automobile, the drums are installed. The best way is to pass a wood shaft about two inches diameter straight through the drums. You can make the drums solid timber, if preferred, but drums with heads to fit on the shaft are the lightest. The heads provide the required flanges for making a hub. The slats are cut out convenient size for nailing about the heads. A detailed drawing of the drum is shown in Fig. 3 and in Fig. 4. These cylinders carry the running back curtain. The running back scene is moved swiftly. As there are tree and telegraph poles painted on the back moving scene, the eye readily catches the prominent moving objects, and the effect is quite natural.

Fig. 2 is a detail of a part of one of the running cylinders. The wooden or hollow metal cylinders can be purchased at any place where theatrical drops are made. The cylinders are placed upright at each end of the window and furnished with a frame with



supporting bearings. The driving gearing is made of wood and is shown in Fig. 2 at F. The shaft for the cylinder is hard wood. The wheel for the driving rope is grooved out of hard wood. The cylinder proper is marked E. The scene itself is painted canvas of light weight.

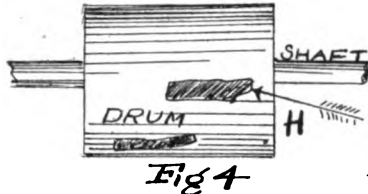
Quite a natural representation of a running automobile can be made with colored light effects at night. Some real shrubbery is distributed to help out rough edges. In one case a fence was removed bodily from a farm and arranged in front of the scene, back of the automobile. As the boards were in line, the eye could not detect whether it moved with the canvas view or not. Quite a number of optical delusions can be worked out to astonish and amuse. And it all helps to create interest and advertise.

In Fig. 3 the end view of the drum is given with the automobile wheel on it. The bumping contrivance G is also shown. It will be noticed that there is a belt and grooved wheel for the operation of the drum. The grooved wheel is turned from a solid piece of hard wood and is adjusted on the shaft next the drum. This wheel carries the driving belt.

In Fig. 4 is a frontal view of one of the drums, showing the bumps H. Going back to the first drawing, the arrangement of the drums below is seen. The

drum shafts are supported in wooden braces nailed to the floor beams below. The belts are common ropes. The driving power is obtained by extending a belt from the additional grooved wheel on the inner driving drum to the motive power of the place. Or a separate motor is used for driving. For experimental purposes the affair can be operated by a boy with a crank.

After the drums are in running order, the car is placed with the wheels thereupon as in Fig. 1. Then the spiral springs C and D are used to hold the car in



Obstructions on the Drum.

position, while the drums run the wheels. The spiral springs are attached to the front and rear and to the woodwork of the window. The springs give ample vibration to make the car have a motion like that in actual moving.

The visional delusion of the running back scenery requires the assistance of scenic artists. It will be noticed that there are upright cylinders A, A.

A FINAL RECKONING.

Why Automobile Drivers Will Finally Pass Through the Pearly Gates.

The world moves. There are some, however, even in this enlightened age and in this country, who would put a scotch to the wheels of progress—who, like Joshua, would command the sun to stand still. This was recently attempted by a reader of a Pennsylvania newspaper. He deified the horse and anathemized the automobile until he could no longer find words to express his praise of the one and his contempt of the other. And this is the way one of the local physicians called him down:

"I see in your issue of this morning an article entitled 'Auto vs. Horse,' signed 'Grandfather.' As a space-writer this contributor is a monumental success; but a perusal of his article causes one to think him as prejudiced as a prominent horse-lover of this community who snorts out 'Nice Toy' or 'Stink Machines' every time an auto passes and feels that he has rid himself of a gem of thought.

There are points about the auto it is not well to forget. If it stays in the shed for a week it hasn't been eating its head off and foundering itself at the same time, nor has it cost one cent during its period of inactivity. It will stand outdoors for any space of time in winter and not be so stiff that it seems a cruelty to drive it home. It will go over vile country roads where a horse would soon tire out and at the end of such a trip be ready for another just like it. It doesn't shy at bits of paper along the road or scare at harmless kites overhead. The sight of a threshing machine or road roller does not fill its heart with terror. Locomotive whistles and blastings along the road do not cause a sudden veering to the side and precipitate you in a ditch. Then, again, there is an immense amount of pleasure in filling your machine with friends and taking them for a spin.

Of course, an auto may break down and you have to walk home. A broken buggy, a lame horse or rotten

harness may cause you to walk, too. You minimize the chances of such an occurrence, however, by inspecting your machine thoroughly once a week and not taking it out without seeing to the gasoline, oil, water and current supply. You can do all this in less time than it takes to hitch up a horse. If you are naturally too indifferent to do this, you have no right to an auto and deserve any roadside mishaps which might come.

As to the liability to personal injury in an auto. It seems to me that there is less chance for injury in a machine which knows only the driver's will than behind a beast which only too often pits its brutal will against the wisdom of the driver. In case of a runaway there are no brakes on the buggy; the auto is equipped with brakes, and if they refuse to act the veriest tyro in automobilism knows that he can bring the car to a sudden stop by throwing in the clutch and withdrawing the switch plug, the work of a second.

And, finally, Mr. "Grandfather," do you know why you read of so many automobile accidents? Principally because autos up to the present time have been owned by people of prominence in their communities; accidents to such people are chronicled in the daily press whether they happen in autos, behind horses, in street cars or on foot. Besides, there is the theatrical element in "The machine was going forty miles per hour," etc., that appeals to the imagination of the reporter and makes a good news item. The speed at which the machine travels, too, makes what would be a trivial accident a serious one, hurling the occupants out of the machine with tremendous velocity, turning what would be a horse and buggy "cut on the head" into an automobile "fracture of the skull."

Three elements are usually responsible for automobile accidents—intoxicating liquors, speed mania and a combination of the two. Liquor is notorious for destroying man's ideas of caution. When caution is gone in an auto driver speed mania reigns supreme and a speeding car guided by an intoxicated person whose brain cannot command the quick, decisive action necessitated by ever changing road conditions, is soon beyond control and a fatality results.

How about accidents to those outside of machines, to pedestrians? A person may step from the sidewalk, never looking either way before crossing the street, and be run over by a machine. That is unavoidable. The same person would probably go past a building operation, walk under a ladder upon which bricks were being carried and be killed by the breaking of a rung in the ladder. That's his fault; he lacks caution, and there's little of justice in accrediting the death of such a careless person to the auto. Again, children will hear the warning honk-honk of the car, and instead of clearing the way will deliberately come from the sidewalk to dance in the road in front of the on-coming machine. Usually they get out of the way in time, but if one of those children slipped on the road in front of the car and it passed over the body, would the autoist really "deserve to be hung" or would the noose better fit the neck of that child's parents?

Circumstances might arise where an automobilist was blamed for an accident that he did not cause. To illustrate: The writer was driving his car along a country road, with which he is familiar at midnight, and saw ahead what appeared to be a pile of dirt in the wagon tracks. He swept by the obstruction, clearing it by six inches as the tire tracks afterwards showed, and on seeing a hat in the roadway further on went back to investigate. The obstruction proved to be a man, stupefied by liquor, who had fallen asleep in the wagon tracks. If the machine had passed over

this seemingly simple pile of dirt, what would the headlines have been when the body was found? "Man run over and killed by an automobile!"

Drop this anti-auto tommy-rot! Talk fairly of the matter! Why tell always of the lives they take and tell nothing of the lives they save? If a machine saves five minutes in carrying a physician to the bedside of a dying patient, it is a chariot of mercy; if it carries an accident case to the hospital before an ambulance arrives on the scene, it may save a life; if it rescues women and children from danger, as it did in the San Francisco horror, it does humanity a signal service; if it gives elderly invalids an opportunity to enjoy the fresh air and God-given sunshine that they would not dare take behind a capricious horse—if the auto does these things, I say that in the final reckoning the driver of the "devil wagons" will be entitled to dash through the pearly gates with the high speed lever sealed in, and no questions asked by the saint on guard.

Friction Drive.

The friction drive is rapidly gaining friends among automobilists. It has been demonstrated that a carefully designed friction drive combined with a car of standard quality, provides a degree of flexibility much desired. Its successful application was first confined to cars of the lighter type only, but it is now in successful operation upon cars of the largest type, as well as upon light and heavy trucks.

A careful canvass among experienced car drivers reveals the undeniable fact that aside from tires and the ignition system, the transmission and clutch mechanism is the most troublesome to maintain. Investigation will prove that the friction system of transmission is the most simple. The question then resolves itself into one of capacity and efficiency only.

Scientific data as to the efficiency of the friction drive is scarce, but there are friction driven cars in the market to-day which will travel as far and as fast as cars of similar weight and power with other systems of transmission, which proves more conclusively than laboratory tests that the friction system is not only a success, but has advantage over those systems employing a multiplicity of gearing which realizes its highest efficiency only when new and in absolutely perfect condition and deteriorates with use.

The type of friction drive used by one of the well-known manufacturers shows an efficiency on high gear of over 92 per cent., compared with 88 per cent. of bevel gears when new and less than 80 per cent. when worn. It is known that many users of cars with geared drives have endeavored to procure friction drive with which to rebuild their cars.

A well designed system of friction drive embodies the following general advantages: Simplicity and flexibility of control with one lever; great range of speeds, freedom from shock in starting and absence of noise. They are "fool proof" and absolutely free from danger of injury by careless manipulation. With these advantages to its credit the future would seem to be bright for the manufacturer of the friction driven car.

More Testimony in Favor of the Steam Car.

The following was not written for publication but we see no reason why it should not be printed, as it adds valuable testimony to the gasoline-steam car discussion:

"I can very readily understand why some people prefer a gasoline car rather than a steamer, though we have quite a number of steam cars in our city, as well as high grade gasoline cars. A great many people are afraid of steam; they seem to have an idea that this

make of cars are dangerous; this is a mistake. I have owned both. My car was never on fire or anything like it. I handled the car myself and looked after it in all of its details, entrusting no part of it to any one. I clean the pilot lights once every two months and do the same with the vaporizer and use a fair grade of gasoline oil, just the same as is used by the gasoline cars. I go on all kinds of roads, go as fast or as slow as I care to go. There never has one single part of the mechanism of this car failed, and I have driven it over 6,000 miles and is to-day in the very pink of condition. Now understand I am talking about the White steamer, don't know anything about any other build of car, that is steam cars, and have had a year's experience with a gasoline car. As before stated my car has cost me fifty cents in six months. This was for a special packing for the valve stems. I run about $8\frac{1}{2}$ or 9 miles to the gallon of gasoline. My car is a 30 horse-power, Model K, runabout, weight 2900 pounds, and goes up hills or through sand faster than I care to ride, and I will say that I am a locomotive engineer and have been accustomed to riding at very high speed. Of course, I did this some years ago, before I was made Master Mechanic, but I have lost none of my nerve when it comes to driving a steam car."

Good Road Rules.

The Wilkinsonville, Pa., Automobile club has adopted the following practical and useful road rules:

When passing vehicles going in the opposite direction keep to your right, and when passing those going in the same direction keep to your left hand side of the road.

Speed on heavy descending grades should not exceed fifteen miles per hour. Brakes should be tested at top or grade. Speed elsewhere always under control; this may be four or forty miles per hour, depending on road traffic conditions.

Run slow on a descending grade when passing a car or heavily loaded team ascending, giving them the greater right of way. When passing cars on a dusty road, run slowly to prevent dust obstructing the view of the road.

Always sound your horn before passing a vehicle to give timely warning of your intention to pass.

Do not open your muffler when running on streets where the noise would be objectionable to residents.

Approach street or railway crossings under perfect control, prepared to stop if necessary.—"Stop, Look, and Listen," before crossing steam railroads.

Approach a horse under perfect control, prepared to stop if necessary to assist in getting a timid animal safely past.

Approach curves where view is obstructed under perfect control, expecting to meet a car, keeping well to the right hand side of the road, sounding the horn frequently to give warning to approaching vehicles.

When passing farm houses where poultry are likely to be on the road, run slowly and give them a chance to get out of the way. Should your car kill any, stop and settle with the owner.

Never pass an automobile disabled without stopping and offering assistance. Every car should carry a manilla rope, twenty-five feet long and $\frac{3}{4}$ inch thick for emergency use.

Upon observing broken bottles or glass, barbed wire, or other tire destroying material, maliciously placed on the road, stop and remove them. If for special reasons a stop cannot be made, then notify approaching cars of the danger.

Upon discovering dangerous places in the road, such as holes, land or rock slides, fallen trees, etc., notify

the nearest farm or other house, also the first hotel stopped at, with the request that motorists be notified.

Light your lamps before it is quite dark, and when standing on the road after dark be particular that your front lights show in the direction of traffic.

A continuous sounding of the horn will be known as a distress signal, and when heard by motorists should be quickly responded to.

Long Stroke Versus Short.

From C. L. v. Berg, M.E.—Iowa.—After having passed the experimental stage with a gas motor and reached a state in which we successfully compete other forms of motive power, the matter of economy and building of a well balanced motor must next be taken up.

The primitive steam engine builder was satisfied to have the engine turn its wheels, but in the last few years it has become necessary to produce the greatest amount of power, on the least fuel and water, and to furnish a balanced engine and a system of governing that is little short of perfection.

The spasmodic application of power of the "one lunged" motor soon was overcome, (in a way) by the multi-cylinder motor, but as it is impractical to have more than four cylinders for the car of everyday's business or pleasure use, and as such a motor, properly balanced should equal one of more cylinders, not well balanced, the time must soon come when all makers will make improvements in this direction. As the weight and size of balance wheel has been cut down on the multi-cylinder motor and the compression increased, coming as it does at a time when the power from this cylinder is at its lowest—having completed almost two revolutions—in the four cycle having to lift the piston, connecting rod, crankshaft, etc., against their gravity, then overcome a high compression, is it not clear to see we need a crankshaft having counter balance weights, the same as any modern steam engine has, even though it gets an application of power four times to the gas motors once, and each of them, only four times as strong!

A long stroke motor, well balanced should run steadier than a short stroke one not balanced. This is the only point in favor of short stroke motors, while the long stroke ones have: First—Owing to a larger radius, the crank gets off its dead center quicker, (which with a motor without off set crank shaft), has the crank in a place to receive the heavy impulse in such a way as to turn the shaft, in place of exerting a force to drive the crank shaft out of its bearings.

Second—As the exhaust valve on gas motors does not open till near the lower dead center, the longer the stroke, the more "expansively" we work the charge, thus lowering its pressure, and temperature which should also require less muffling and back pressure.

Third—With a long stroke and cylinder, do we not get additional cooling surface, and is this not a benefit to either water or air cooled motors?

We do not need to use an indicator to prove the power we are losing by the high pressure of the explosive charge when it is released by the exhaust. Simply let the cylinder exhaust pipe open direct in the air, in place of the muffler and it will prove the power we are losing in each explosion.

A certain pressure is given by the explosion. If we have a crank that gets into a position to utilize the sooner and stays there longer, besides giving the explosion a greater leverage on its load, will not two engines made exactly alike except the stroke, show in favor of the long stroke?

Having proven the ability of a gas motor to make

2,000 and over strokes per minute, it shows the extra piston speed necessary for a longer stroke offers no objections.

It is pleasing to note a number of makers of note disregard the equal bore and stroke, and if the makers would make unbiased, comparative tests, it would no doubt result in an improvement, costing but little and valuable.

Looking for Improvements.

From Francis Alger, Massachusetts.—I have often thought that the gas engine automobile could be very much simplified and improved by the combination of the two following principles in its construction, each of which has, I think, been a success: I refer to the valveless form of engine and the friction drive. I know the latter has been largely used on light machines, though I believe the "Cartercar" uses it on heavy cars also.

The valveless engine has had its share of abuse and praise, but it has by virtue of improvements emerged from its experimental stage, a success.

The "Elmore," a regular touring car, is valveless, and I understand that it has proved very satisfactory.

Now why does not some enterprising manufacturer combine these two principles in their product?

Having no valves to grind or keep adjusted, no differential gears with their noise and troubles, and only one lever for various speeds and powers is of great advantage. The public would soon find out the advantage of such a machine.

Saving His Salary.

A good chauffeur can save his salary by looking after running details with some intelligence and care. Take the tires, for illustration, some drivers can run thousands of miles without experiencing any trouble, while others may only go a few hundred miles before punctures, bursts and other tire worries are encountered. A number of cases have occurred where motor-car owners have complained of excessive wear of outer covers of the front tires. Although the blame has been laid at the door of the manufacturers, if drivers would carefully examine their cars they would find that the front wheels are not perfectly parallel. The least departure from parallelism causes a certain amount of sliding friction between the tires and the road, with disastrous results to the tires. The bursting of a tire is not a matter to be regarded lightly, and when it occurs on one of the steering wheels may be the cause of a serious accident.

An Invention Not Needed.

An invention for the protection of pedestrians who rush in front of automobiles which are going at a good rate of speed has been invented and had a successful trial in Paris. Instead of being run over the victim is picked up and deposited in a net attached to the car. An invention of this kind is of little use. With due care on the part of both pedestrians and car drivers, no one need be run over or injured. An "ounce of prevention is worth a pound of cure" in the automobile business as well as in anything else.

Keep It Out of the Cylinder.

Tie a length of strong string to a small piece of waste and forced it into the cylinder to prevent emery or other matter from falling into the cylinder while grinding in the valves. Then if anything should happen to fall off the valve the waste catches it. It may be drawn out by means of the string after the work is over.

MORE ABOUT CHAUFFEURS.

Their Duties, Pay and How They Often Make Mistakes.

It should not be forgotten that there is competition among chauffeurs as well as among all other workers, and the most competent, faithful and industrious only get and hold positions. Said a well-known dealer the other day:

"There are men who come to me out of work, and walking the streets, and say, 'Oh, if I had only learned to drive a car! If I had only paid some one to teach me when I had a job and the money! If I ever get a steady job again it will be the first thing that I will do.' But they won't. When they get another job they won't save a cent from week to week and won't give the learning of the chauffeur's business another thought until hard times come again and they are up against it a second time. On the other hand, this fellow from the country has been using his spare time and time that he had to scramble to spare and he has nothing to fear."

The garage man said that in these times, when other men are being laid off in other trades, he did not know of a single instance in which a chauffeur had been laid off except for incompetency or for the fact that the owner was laying the car up for the winter. On the other hand, he has had calls very recently for chauffeurs, one at 25 a week to start with.

When automobiles first came into use and the trade of chauffeur was created, the chauffeurs were almost invariably men who had worked in the automobile factories and had there learned the care and use of the machines. Later, however, with the rapid development of the industry and the enormous increase in the use of motor cars, this source of supply was entirely unequal to the demand. From then on chauffeurs came from a number of sources. The knowledge of cars and the interest in them became generally diffused and many mechanics and young men of all trades acquired a little knowledge of cars which they could rapidly increase by actual practice. Then schools, some good and some bad, sprang up for the teaching of the business. In addition there are not a few cases on record where men who have owned cars have been forced to sell them and have turned chauffeur for a friend or for some one else. Again, men employed with horses as coachmen or on delivery teams, have seen their horses replaced by motors and so have had the choice of learning the new trade or looking for another job.

As to the chauffeur's position, it is like anything else, it has its pleasures and its disadvantages. The pay is relatively high, and the work is pleasant, but uneven, not only in the way of effort and time, but in the matter of disposition. One day a chauffeur may have practically nothing to do. The next day he may have to stand in front of a theater or a ball room until 2 or 3 in the morning. Then he may be called upon to take a guest to a 6 o'clock train the same morning.

The making of a successful chauffeur for a private family is more a matter of personality than expert ability. And right here is where many a chauffeur loses out. The average American has pretty high ideas about his own independence and is always afraid that some one is going to impose on him. Thus, if a chauffeur is told to do something that is not strictly in the line of running a motor car, he may get up on his dignity and either refuse to do it or make himself so disagreeable that he is at continual odds with his employer. Only the other day a lady called at one of the

garages and said that she could do nothing with her chauffeur because he was getting so self-important. She was advised to discharge him and did so. When another was recommended and took up the work he found that the lady's garage and the car were in such shape that the latter was actually not safe to run to the shop for repairs and had to be towed.

On the other hand, if a man shows willingness and tact, he can make himself invaluable in the family which he is serving, and will hold a trusted and respected position therein. It is a well known fact that many chauffeurs hold their places because they are liked and trusted by their employers and their families, although a better mechanic could be obtained. For this very reason many owners have changed their coachmen into chauffeurs. The drivers often make good motormen. Sometimes they do not. The average coachman is not used to doing a great deal of thinking for himself except along one or two lines, and therefore is sometimes not quick-witted enough to make a good chauffeur, with the grasp that the latter must have on all mechanical subjects, but then, on the other hand, he makes a good man in the seat, as he is used to the road and to pulling himself out of a tight position.

A good chauffeur can expect from \$15 to \$50 a week, according to place and circumstances. But the \$15 per week places are legion and the \$50 per week ones almost as rare as a white blackbird. There are men who work for less, but they are work what they are paid. There are chauffeurs who know nothing of their car except driving. The case of one of these comes to mind who ran one car to the junk heap simply because he knew nothing of the workings of his engine. He was a small priced man. After the first car was used up his employer bought a six-cylinder, and it was not long before two of the cylinders were out of commission. The chauffeur couldn't repair them and he couldn't get any of the garage men to do it because they were all "on to" him. He was discharged, but probably the owner is looking for another low-priced chauffeur.

A chauffeur has, in the main, a pleasant life if he is willing to make it so. He has pleasant surroundings. Sometimes he is given half pay during the winter with nothing to do. A married man may be given the occupancy of a cottage. He has a chance to spend a pleasant summer at a resort, or touring in this country and Europe. He is well treated by a pleasant class of people. There has, as yet, developed no old age limit, for a reliable man, and hard times would seem to make less difference than in other trades.

Running Light.

An engine working the car and running light is under two distinct differences. Working, the car has the fly-wheel power of the car; it is "backed" by a ton in motion with itself, and is thus held "steady." Running light, it has no staying power. Therefore, before declutching, throttle down your engine. Before starting your car throttle down to the extent that the engine will easily "take hold."

Never turn the front wheels with the steering gear while the car is stationary. Not only does it strain the gear, but wears the tires. The better way is to move the wheels with the hands direct.

Practice using the hand brake, so that in an emergency its existence may not be forgotten.

Electric Car Improvements.

Improvements in electric cars have kept pace with those of gasoline and steam cars. Not more than ten years ago electric vehicles were decidedly imperfect in many respects. This condition has gradually changed, and the electric car of to-day is economical, simple, handsome, and free from complications which often bewilder the owner of a gasoline car. The simplicity of electric vehicles makes them the most desirable class of automobiles for that large class of people who do not care for speed exceeding twenty-five miles an hour, and who, for various reasons, prefer to drive the car in which they ride.

The mileage and service obtained from the batteries which were first used in electric vehicles were far from satisfactory. Much capital and energy were consumed before the manufacturer was able to send out a car that was really satisfactory, and which would give a reasonable mileage on one charge, and which would produce a sufficient amount of speed to satisfy the purchaser.

Greater progress has been made in storage battery efficiency and reduction of weight, with greater consequent speed and mileage during the past three years than for the entire experimental period prior to that time. The battery has been made more efficient and the construction of the mechanical parts has been refined and bettered. The inevitable result has been a great reduction in the expense of operation and a minimizing of the care required to keep the car in condition. The facilities for charging electric vehicles have been improved. In most towns and cities provisions have been made at the leadnig garages for the recharging of batteries at small expense to the owner. Long runs on one charge of the battery are now possible.

For park, city and suburban use the electric is an ideal carriage. The greatest mileage on one charge in 1900 which could be obtained from any electric vehicle was twenty-five miles. Compare this with the splendid results recently accomplished.

The electric automobile is not a machine, for there is little or no machinery to it, therefore, it is pleasing to follow along the lines of the best in horse-drawn vehicles of similar patterns. The brougham, since Lord Brougham first designed it and gave it his name, has been and always will remain the same in general design, whether drawn by a horse or propelled by a current from a storage battery.

From Low to High Tension.

If it is found desirable to convert a low tension magneto system into a high tension, using the original machine and simply sending the low-tension current through a transforming coil, adaptors for ordinary high-tension plugs must be made to replace the low-tension trip gear. The magneto could remain as it is, and then it would be necessary to arrange for a combined low-tension contact maker and a high-tension distributor and a transforming coil. The distributor and make-and-break would simply have to be driven from the half-speed shaft and set in the correct position to ensure timing the cylinders properly. As there is only one wire from a low-tension machine, and this comes direct from the armature via a carbon brush, this would go to one connection of the make-and-break coil, while the other terminal would simply be a frame connection back to the magneto. The high-tension terminal of the coil would connect in the usual way to the distributor, from which the plug connections would be made. Whether an ordinary non-vibrating coil would answer, or whether it would have to be specially wound, would be a matter for experiment.

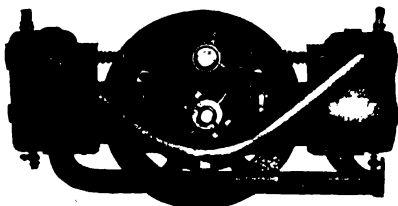
A Weak Vibrator.

We were recently called to prescribe for an old car which had lost its pristine vigor. Everything appeared to be perfect, but at last we noticed that the vibrator blade was so antique and had been bent backwards and forwards so many times in well-meant attempts at adjustment that it had practically no spring left in it at all, and its action was sloppy and listless. We prescribed a new one, and the advice was greeted with wails from the thrifty owner, who had just spent good money in fitting a new platinum-iridium rivet to it. So rather than scrap it we procured a piece of old clock spring some 1 1/2 inches long, knocked a hole in one end of this, and threaded it over the set-screw holding the vibrator blade in such wise that its convex side pressed against the weak blade. The improvement in running was most marked, and no new part was required.

The Maxwell-Briscoe Motor Co. wish it most emphatically understood that it is not interested in any consolidated scheme with any other manufacturers, and that none of its stockholders are thus connected.

THE BEILFUSS DOUBLE OPPOSED CYLINDER AUTOMOBILE ENGINE.

This engine, which is illustrated herewith is designed especially for hard work, reliability and durability. It is easy and quick to start and in every way satisfactory.



The Beilfuss Engine.

This is an 18-20 horse power engine, but the manufacturers inform us that it has replaced engines with guarantee of 20-22 horse power and has given more power and better satisfaction. This engine should particularly interest car owners who want to

put in a more powerful engine, as this engine can be easily installed in any car, from the smallest Olds Runabout to the largest sized car. Many motorists who are dissatisfied with the power furnished originally with the cars they have bought have put in these Beilfuss engines with great success. Every reader of this journal should investigate. Write now for description and prices and mention the AUTOMOBILE DEALER AND REPAIRER.

C. O. T. ACID CURE SOLUTION.—A good many of our readers will be interested in the announcement on another page of Chas. O. Tingley & Co., Rahway, N. J., who manufacture the C. O. T. Acid Cure Solution and Fluid, which will fill up the digouts in the rubber of your outer casing. A 4 ounce tube will be sent to any address for 50 cents. You can use it while you are travelling or at any time. In ordering mention THE AUTOMOBILE DEALER AND REPAIRER.

"MORE MILES TO THE GALLON.—The Vac-

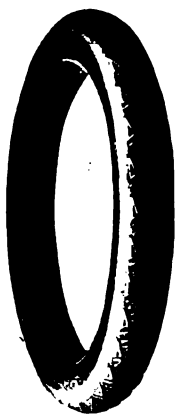
uum Oil Company, of Rochester, N. Y., have an announcement in this issue with respect to their "Mobiloil." They say that Mobiloil saves the wear of your car, the waste of gasoline and much of the money spent for repairs. It is made in six different grades to suit the lubrication of every make of automobile. But consult their advertisement and write for their catalogue mentioning THE AUTOMOBILE DEALER AND REPAIRER.

SWINEHART DEPENDABLE TIRES.—The Swinehart Clincher Tire & Rubber Co., Aron, Ohio, have an announcement in this issue of their Dependable Tires. They say that these tires have been used for five years on every make of pleasure car, and are practically as easy riding as well inflated pneumatics. They claim that they wear from three to five times longer than pneumatics. Of course, there is no danger of punctures or blow-outs or the ordinary tire troubles. Full details are given in catalogue No. 5, which will be sent to any address on application.

TWO NEW TIRE DEVICES.

The Firestone Tire and Rubber Company, Akron, Ohio, have put two new tire devices on the market which will be noted with interest by dealers and by owners of cars.

The Firestone demountable rim may be used in connection with clincher or quick detachable tires and consists of three parts; channel rim, locking rim and demountable portion containing the tire. It has no narrow wedge shapes and no sharp angles so that its parts cannot rust together and make



Non Skid Tread.

Demountable Rim.
Firestone Tire and Rubber Co., Akron, Ohio.

the rim difficult to manipulate. This is the same equipment as was used in connection with Firestone tires by the Loconobile in winning the Fairmount Park race at Philadelphia, October 10.

The Firestone non-skid is an all-rubber non-skid tread formed by the raised oblique lettering "Firestone Non-Skid," arranged in rows across the tread surface of the tire. It is claimed to outclass any other non-skid in the number and variety of angles, edges and points of road contact, thus securing better anti-skid properties, and long-lived effectiveness.

In writing for further particulars, mention this magazine.

THE CLIMAX AIR COOLED MOTORS.—In this issue, will be found the announcement of the Climax Electric Works, of New Salem, Mass., manufacturers of a high grade of automobile motors, which they guarantee against defective material and workmanship. They want to place their catalogue in the hands of every reader who is interested in a motor. In writing for it, mention THE AUTOMOBILE DEALER AND REPAIRER.

LOBEE PUMP.—Lobee Pump & Machinery Co., 14-18 Erie Street, Buffalo, N. Y., say if you want good circulation on your automobile to use one of their pumps. Address them as above for further particulars and prices, mentioning THE AUTOMOBILE DEALER AND REPAIRER.

WATER-COOLED GARAGE COMPRESSORS.—In this issue George S. Comstock, Mechanicsburg, Pa., comes before our readers with an announcement of his Water-cooled Garage Compressors, made in all sizes. Write to him for descriptive circular and price list.

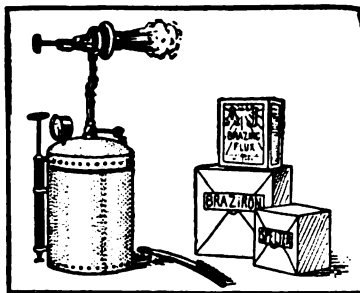
TIRES.—The Excelsior Tire Co., 1775-1779 Broadway, New York City, have a new announcement in this issue headed "Tires," which should be interesting to many readers. Prices are quoted which seem to be attractive, but consult their advertisement and in ordering or writing for further particulars mention THE AUTOMOBILE DEALER AND REPAIRER.

THE "K. C." KITSEE CHANGEABLE STORAGE BATTERY.—We wish to especially bring to the attention of the trade and to the notice of automobilists everywhere, the Kitsee Changeable Dry Storage Battery, popularly known as the "K. C." Storage Battery. These batteries are sold on a novel plan as any battery when exhausted or discharged can be exchanged for a charged cell, by applying to any dealer handling "K. C." batteries, the fee for such exchange being only 35 cents per cell. Experience with storage batteries has proven conclusively that more batteries have been ruined in being recharged by incompetent persons than from any other cause. As these batteries are all recharged by the manufacturers they are kept in good condition all the time, and the purchaser of a "K. C." has a battery for life for the one purchase price. This battery is put up in a hard rubber jar. Solid electrolyte is used, so the battery is commercially dry, and can therefore be shipped anywhere by freight fully charged and ready for use. By connecting two or more of these cells you can have a battery of any desired voltage for ignition purposes. With four of these a good lively spark may be obtained. Agents for the "K. C." cells may be found almost everywhere, but readers of this journal are particularly urged to write direct to E. L. Bevan, 628 Connell Building, Scranton, Pa., for interesting free literature, giving full particulars, prices, etc. Do not forget when writing to mention the AUTOMOBILE DEALER AND REPAIRER.

THE A. & J. Manufacturing Company, 26 West Randolph street, Chicago, Ill., whose announcement will be found on another page, are putting on the market a cast iron brazing outfit (see accompanying engraving) which sells at a moderate price. Write to them for full particulars and prices, mentioning THE AUTOMOBILE DEALER AND REPAIRER. Their outfit will braze not only cast iron, but also steel, and they give full directions concerning tempering, hardening, forging and annealing.

BRAZING CAST IRON.

Cast iron brazing in the United States has become an important and well established industry. In nearly all the large cities there are shops being run at a good profit. Cast iron brazing is a great aid to automobile garages and re-



Cast Iron Brazing Outfit.

pair shops, as well as all kinds of machine shops. Repair jobs can generally be done in a hurry and the saving of time is a very important item to the owner of the broken piece. The repairer is able to charge a higher price for this class of work than for ordinary machine work, and the customer is glad to pay it.

NEW LEATHER IN YOUR AUTO.—The Enamelac Varnish Company, Department L-F, Racine Wis., have an announcement in this issue which should interest a good

many of our readers. They say that their Enamelac Leather Varnish will restore the color and finish, or change the color of leathers and imitation leathers that have become worn, soiled and discolored. Old red leather can be restored to bright new red, or changed to black, green or brown. It is not a harness dressing and it will not soil the clothes. It is water-proof and dries in a couple of hours. It can be applied with a brush. This company has an attractive proposition to make to dealers. Write for it.

A CONVENIENT GASOLINE TANK.

Illustrated herewith will be found a runabout tank for use in garages and for



Eastern Runabout Tank.

filling car tanks from the sidewalks. Everything about it is simple and it is strong and well built. The pump has a dial to show the amount of oil that is being put into the auto tank. With the tank and pump is furnished 9 feet of heavy hose with a shut-off valve on the end. The end of the hose is also fitted with a filter, the oil being pumped through a fine strainer or chamois so that no dirt can get into the oil tank. This tank seems to fill the proverbial "long felt want" to meet all requirements. For any further information address the Eastern Oil Tank Company, Lowell, Mass., and please mention this magazine.

AKRON REPAIR KIT.—The Empire Manufacturing Co., No. 26 Beech street, Akron, Ohio, offer in our advertising columns their Repair Kit, which they say makes permanent repairs and produces the same effect as vulcanization. Their Aluminum Vise is intended to be used in applying patches to inner tubes. It holds the patches firmly in place while the cement is setting and vulcanizing. But consult their announcement and write for further particulars mentioning the AUTOMOBILE DEALER AND REPAIRER.



More Miles To The Gallon

Unless your car has perfect lubrication, your gasoline is used for friction instead of miles of speed. The use of vacuum MOBILOIL saves the wear of your car, the waste of gasoline, and most of the money that goes for repairs. Vacuum MOBILOIL is made in six different grades to suit the lubrication of every automobile made. One of these grades is exactly adapted to the needs of *your* car. Its use is an investment that saves expense. It will end forever your lubrication troubles, and add to your pleasure and the life of your car.



Write for free booklet showing grade of MOBILOIL adapted to the use of every car. Gives track records to date, and money-saving motor hints.

Vacuum MOBILOIL

in barrels, and in cans with patent pouring spout is sold by dealers everywhere. Manufactured by VACUUM OIL CO., Rochester, N. Y.

Diamond

Repair Material

Tread Stock

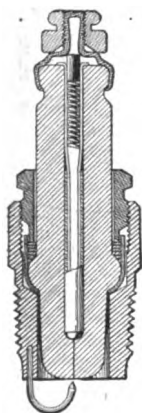
Fabric

Logically made in the logical Diamond Way.

The same high quality stock, scientific research and absolute exactness in manufacture that have made Diamond Tires the world wide synonym for Tire Quality are found as well in all Diamond Repair Material.

Latest catalog and prices on request.

The Diamond Rubber Co.
AKRON, O.



Note the vast difference in the construction between this and the ordinary Plug. It will always spark because it will not short-circuit and no fouling matter can obstruct the sparking point.

THERE'S A DEMAND FOR THIS PLUG

Reliance
(REG. U.S. PAT. OFF.)

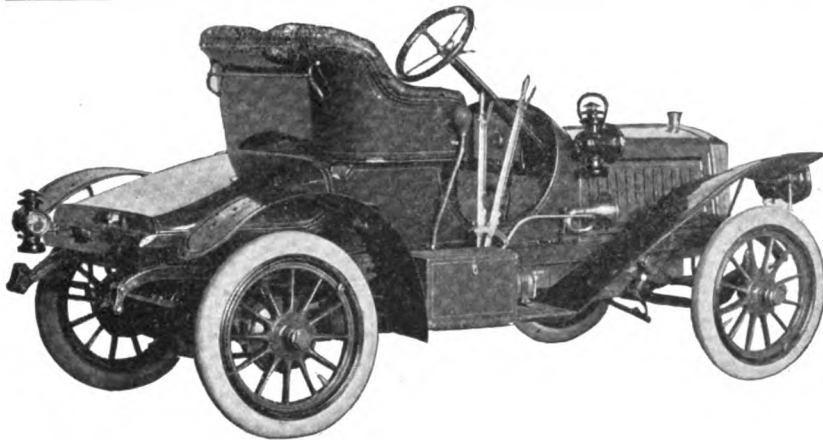
There's a reason: First, our plug is all that we represent it to be. Second, our price is consistent with the article. Third, our advertising is conservative and only good, honest facts are embodied therein. When you buy why not buy a Spark Plug that really gives the best of service, and is positively made of the best material obtainable? Let's tell you more. Send for booklet on Spark Plugs. . . .

JEFFERY-DEWITT CO., 231 High Street, Newark, N. J.

*S. F. Stephenson, Agents for United Kingdom, 19 Canning Pl., Liverpool, Eng.
Armand Frey & Co., Agents for Continental Europe, Berlin, Germany.*

The fact that it will spark in water is proof that it will spark in the cylinder at any time under any conditions. This feature means much and we'll tell you all about it by the asking.





This shows a Mitchell H to which an Artz Folding Tonneau is fitted. It is still a run-about, and only 55 pounds heavier; yet the extra seat is there, protected from dust, mud, and rain, and can be opened ready for use in five seconds without the use of any tools. There is room inside for pump, tools, and extra wraps.

\$100 LIST

Made for many other cars.

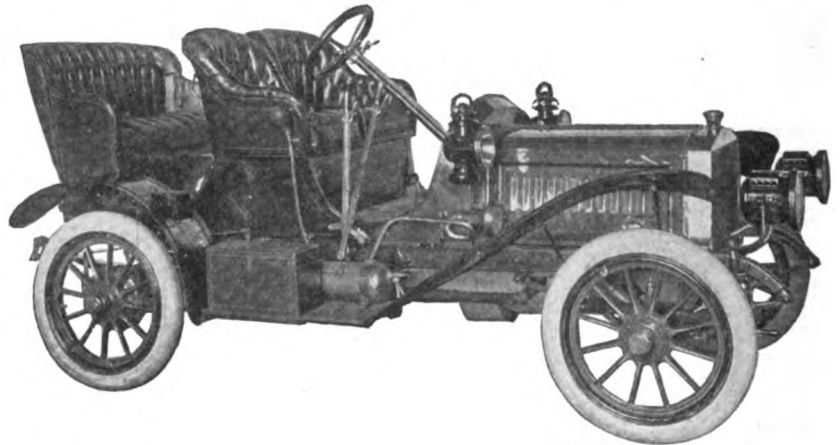
DEALERS ORDER ONE

This shows the folding tonneau open and ready for use. In this position it is as firm, strong, and comfortable as a standing tonneau, and provides for "the occasional extra two." A Rubber floor mat and all fastenings go with each tonneau.

Dayton Folding Tonneau Co.

Manufacturers Automobile Bodies and
Five Ply Seat Backs.

618 Geyer Street, Dayton, Ohio.

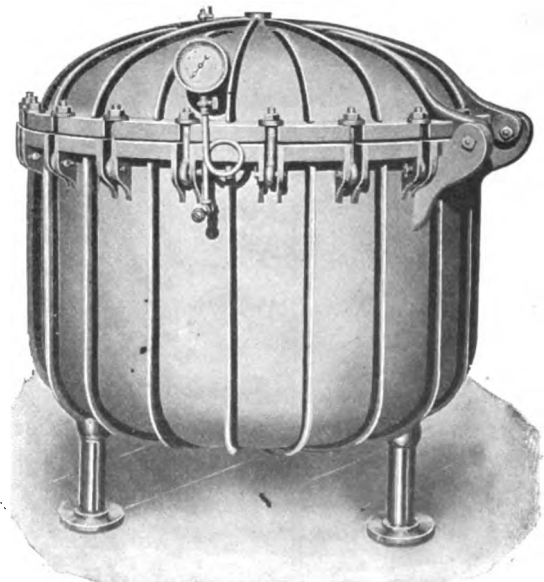


Spark Plug Tests.

To all motorists, and more especially to beginners, there sooner or later comes a day when ignition tests are being carried out with one or more of the sparking plugs exposed, in order that the spark may be verified by actual sight. This is usually done by unscrewing the plug after taking off its wire, recoupling up the wire, and then balancing the plug on some convenient corner of the engine head. Several of the minor annoyances which render the most peaceful life chequered at times are known to occur in this process. One is that the terminal end of the plug has an aggravating habit of tumbling into the earth contact and short circuiting the spark; another is that the plug will roll off the engine, and as the earth return is thereby very possibly destroyed (if the plug hang swinging), a considerable strain is thrown on the coil, and eventual failure of the internal insulation has often been produced in this way. Drivers who are particular about details may value a suggestion which always simplifies this process. A small metal bracket may be rigged up as per enclosed sketch. One end of it is eyeleted, and may be threaded over any convenient bolt near the plug orifice. Plug tests are then made without detaching the wire at all; the nut on the central electrode is simply slacked back a little, the plug removed, and hung inverted in the forked end of the bracket while the tests are made. The bracket further comes in handy when cleaning a plug that is too hot to hold.

Keep your tools off the nicely varnished parts of the car, as for instance, the mud guards. If you must lay a tool on the front mud guard, lay a piece of cloth on the guard first.

== AUTO TIRE == REPAIR OUTFITS



RETREADING KETTLE

Made of cast iron. Fitted with a steam gauge and air cock. Its capacity is six tires, 4½x36 inches.

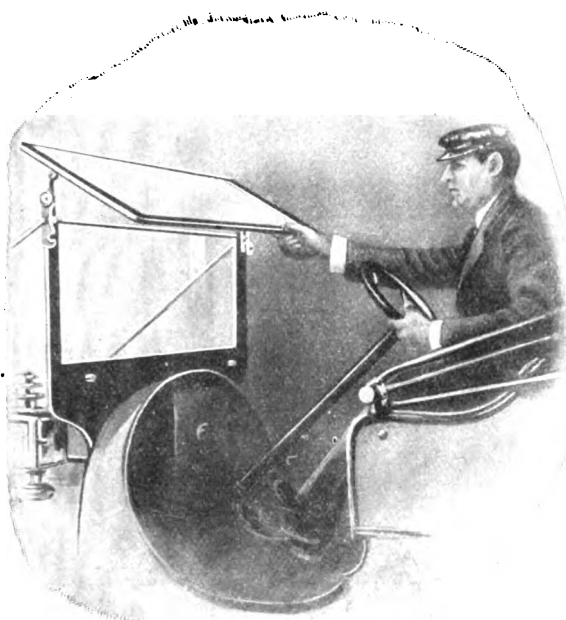
Write for printed matter of other devices used in repairing and retreading tires.

SEND FOR FULL INFORMATION.

AUTO-TIRE VULCANIZING CO.

Manufacturers - Lowell, Mass., U. S. A.

Please mention the Automobile Dealer and Repairer when writing to advertisers.



Vanguard Wind Shields and Bumpers

are built of the finest material, mechanically perfect and so constructed that they become an integral part of cars to which they are attached.

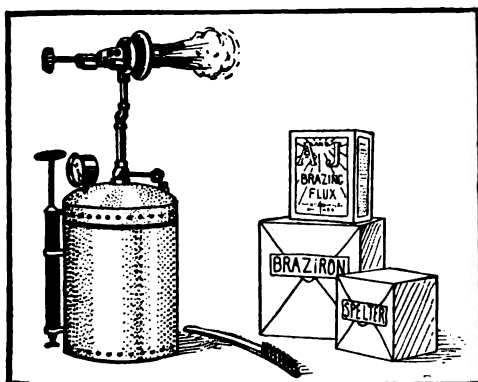
WIND SHIELDS
\$35



BUMPERS
\$12 and \$15

We are the pioneers in honest priced Automobile accessories. Watch for our new patented Spark Plug. Write for our new Catalogue and Booklet, "Way Ahead," and get our terms and discounts to dealers.

Vanguard Manufacturing Company,
112 CASS ST., JOLIET, ILL.



REPAIRING CRACKED CYLINDERS EASY WITH BRAZIRON OUTFIT.

PRICE MODERATE.

Outfit good for brazing all kinds of iron and steel, and for tempering hardening, forging and annealing.

Write for full particulars.

THE A. & J. MFG. CO.,
18 West Randolph St., Chicago, Ill.

A BATTERY BARGAIN

A 6 Volt, 60 Ampere Storage Battery

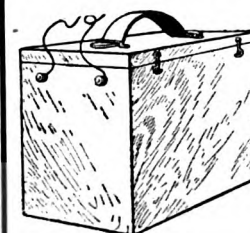
GUARANTEED 1 YEAR

\$9.75

Selling regularly at \$22.50

Special discount for quantity order.

S. BREAKSTONE
900 Fisher Bldg.
CHICAGO, ILL.



We Make AUTOMOBILE TOPS

Auto Upholstery, Slip Covers, Dust Covers and Wind Shields, also Limousine, Landaulet, Touring and Runabout Bodies Fitted on Chassis. ALSO LETTERING AND SCROLLING.
YONKERS AUTO TOP CO.,
16 Nipperhan Street, Yonkers, N. Y.

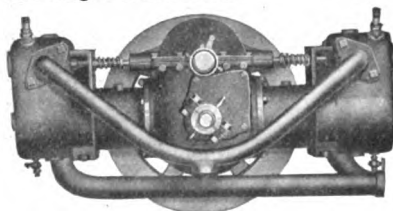
BRENNAN MOTORS.—If your car does not run right perhaps the fault lies with the motor, and if so, it will pay you to investigate the Brennan Motors, manufactured by the Brennan Motor Manufacturing Company, Syracuse, N. Y. The manufacturers state that these motors have stood every test for reliability and they can be mounted on all standard makes of cars. But write for full particulars and prices, including the guarantee that goes with each motor, and mention THE AUTOMOBILE DEALER AND REPAIRER.

THE Stewart & Clark Mfg. Co. of Chicago, manufacturers of the Stewart Speedometer, have opened a branch office at 697 Woodward Avenue, Detroit, which will be in charge of C. D. Brelsford, who will take care of all the trade in that section and also all the Michigan business.

The Beilfuss Double Opposed Motor

Makes a hit wherever used on account of its compactness.

Can be placed in any car from the small Olds Runabout to the larger sized cars.

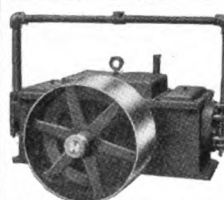


Made in two sizes:
10-12 H. P. and 18-20 H. P.
Water Cooled.

Write to day for Circular and Prices. Simplest and Strongest Motor Built.

Beilfuss Motor Co.
LANSING, MICH.

Please mention the Auto Dealer and Repairer



AIR COMPRESSORS
Patented

WATER-COOLED GARAGE COMPRESSOR
Weight 900 lbs., a real machine, not a toy.

Also other sizes.
Send for Descriptive Circular and Price List

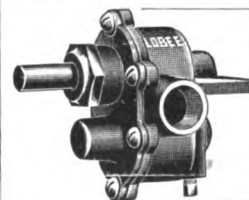
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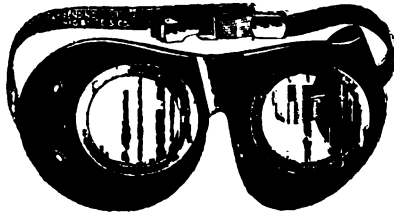
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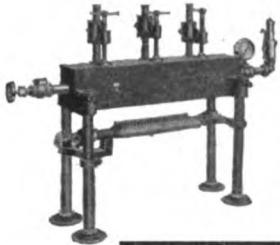
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NEWEST RELATIVE OF THE "EXCELSIOR."

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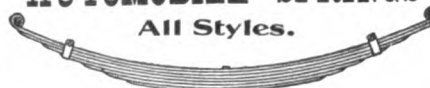
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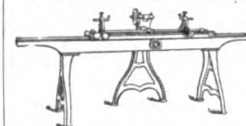
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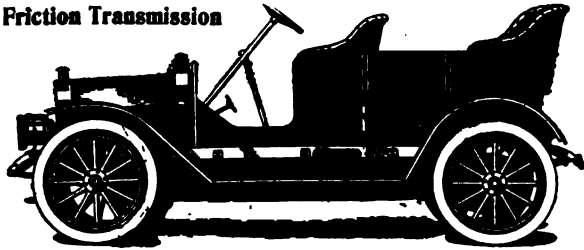
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Without the noise which so many make as they pass down the street.

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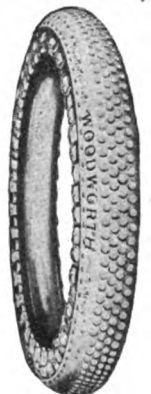


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Absolute Protection to Tires and Automobile.

No punctures, No skidding, No troubles, worries, disappointments, No loss of time or money when Woodworth Treads are used.

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Thicknesses of strong, pliable, chrome leather, thickly studded with round headed steel rivets present an armored surface to broken glass, nails, sharp stones, jagged bits of metal, anything which would cut or pierce the naked tire.

Easily and quickly attached to the tire. Once adjusted, stay adjusted until they are taken off.

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NOT A
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Successfully used for the past five years on every make of pleasure car. Practically as easy riding as well inflated pneumatics. Wear from 3 to 5 times longer than the best inflated tires. No punctures, no blow-outs and no tire trouble to contend with. Easily applied to standard clincher or universal rims with free applying tool.

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Permanently Repairs

STONE-CUTS, DIGOUTS AND GOUGES

ADDS 1000 MILES TO THE LIFE OF YOUR TIRES

\$1.00 JOBBERS AND DEALERS \$1.00

— OR —

STANDARD LEATHER WASHER MFG. CO.,

Newark, N. J., U. S. A.

THE BUFFALO ELECTRIC VULCANIZER—Many of our readers will no doubt be interested in the announcement in this issue of the Buffalo Electric Vulcanizer Co., 322 Erie Co. Bank Building, Buffalo, N. Y. They say that their vulcanizer will enable people to repair their own tires. They have just brought out a little booklet entitled "Tire Troubles," which they will send free of charge to any reader writing for it and mentioning the **AUTOMOBILE DEALER AND REPAIRER**.

PARKS. TIRE REPAIR SPECIALTIES.—It seems hardly necessary to direct attention to the full page announcement in this issue of the F. B. Parks Co., 173 Prescott street, Grand Rapids, Mich. Many things are illustrated and described in this advertisement, which ought to be of interest to all automobilists. In ordering or writing mention **THE AUTOMOBILE DEALER AND REPAIRER**.

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THE RELIANCE SPARK PLUG.—In this issue will be found the announcement of Jeffery DeWitt Co., 231 High street, Newark, N. J., manufacturers of the "Reliance Spark Plugs." The fact that this plug will spark in water is proof that it will spark in the cylinder, the manufacturers say, at any time and under any conditions. They say it is impossible for it to short circuit, but they would like to tell you more about it, in fact, all about it. Write them for further details and mention **THE AUTOMOBILE DEALER AND REPAIRER**.

GRAY'S FILL-GUM OUTFIT.—The attention of our readers is directed to the announcement in this issue of the Standard Leather Washer Mfg. Co., Newark, N. J. Their outfit permanently repairs they say, stone cuts, digouts and gouges, and will add 1,000 miles to the life of tires. It is for sale

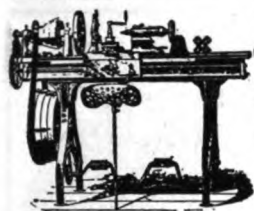
by jobbers and dealers everywhere or can be obtained from the manufacturers. See their advertisement and in writing mention **THE AUTOMOBILE DEALER AND REPAIRER**.

THE TIRE PROBLEM SOLVED.—This is the heading of the announcement in this issue of the Cleveland Punctureproof Tire Co., 58 East 7th Ave., Columbus, Ohio. This company is desirous of placing its little booklet, giving full particulars, in the hands of every reader; you may be interested. In writing for it mention **THE AUTOMOBILE DEALER AND REPAIRER**.

THE Standard Leather Washer Manufacturing Company, of Newark, N. J., manufacturers of Gray's Touring Necessities, have recently been appointed distributors for the well-known Sponge Rubber Bicycle and Motorcycle Grips, by the patentees, the Mattson Rubber Company. The Standard Leather Washer Manufacturing Company are marketing these goods in both plain and leather-covered styles and are also offering the trade a complete line of motorcycle and bicycle grips made under their own patents.

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9" swing
11" swing
13" swing

For Repair Work our No. 13 Lathe is right; has 13" swing, auto cross feed, length of beds from 5 to 10 feet long; furnished with counter-shaft or foot-power.

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KE-PA-GO-IN TIRES

Will then speak for themselves, but it's your first say. Shall we send you particulars?
BEEBE-ELLIOTT CO., RACINE, WIS.

4X4 AIR COOLED MOTORS

\$80.00 each for April only

Transmissions,

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Feed Water Heater,
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For all makes of steamers, including White's and Stanley's. Write for new catalogue.



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MILLER & STARR

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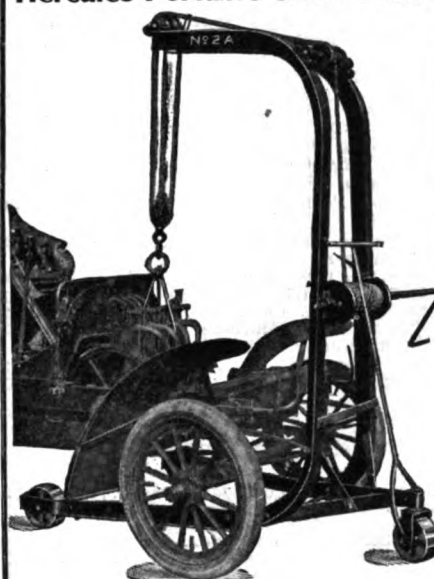
CAST IRON BRAZING easy with UNIVERSAL FLUXINE

You can solder cracked water jackets easy with UNIVERSAL SOLDERING FLUID.
Booklet.

Universal Fluxine Co., Urbana, Ohio



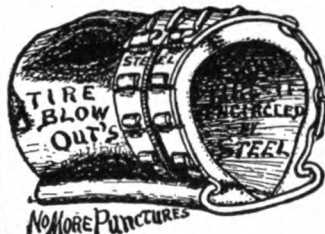
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Patented December 19, 1905

See how easy it does it. Fills the bill for Automobile Factory and Garage Crane. Many of them using it. You should. Send for descriptive circular.
WILLIAM S. NICHOLLS, Hoosic Falls, N. Y.

PROTECT YOUR NEW TIRES. REPAIR THE OLD ONES.

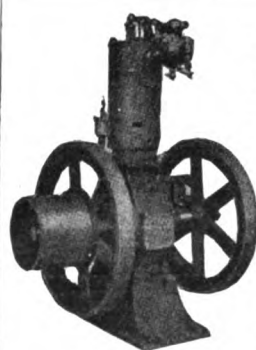


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Steel Link Bands

Hooks to Rim

You can fix Blowout quick. If tire is completely covered by these clasps you cannot have Blowouts, Punctures, Rim Cuts or Wearing off of tire. (Any old tire is good. How can it get away if encircled by steel?) As flexible as ever. And Skid.
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THE GARDNER Gasoline Engine can be used for your machine shop, driving air compressors, dynamos, or any other purpose where a reliable, efficient and economical power is wanted. Built of the best material throughout. They stand up under the hardest service. Write for printed matter. The price is right. We want reliable agents in all parts of the country.
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Enamelac Leather Finish will restore the color and finish or change the color of leathers and imitation leathers that have become worn, soiled and discolored. Old red leather can be restored to bright new red, or changed to black, brown, green, &c. Not a harness dressing. Will not soil clothes. Is waterproof. Dries in two hours. Applied with brush. Brush for applying free with each can. Sufficient amount to refinish the leather in large car for ONE DOLLAR. Attractive proposition for dealers. Ask us.

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We can sell you any make, any size or style tire and tube for less money than any dealer anywhere in the United States.

We have contracts with the leading makers of automobile tires to sell for them any quantity of surplus stock, enabling us to quote from 60% to 70% discount from the regular price. Do not buy tires until you get our prices. Bargains in all makes of tires and tubes.

Clinchers, Dunlops, Quick Detachables

We guarantee these brand new, clean, fresh, 1908 stock. This lot includes Morgan & Wright, Ajax, Diamond, Continental, Ennis, Pennsylvania, etc. We are selling the lot while they last.

Size.	CASINGS.		TUBES.	
	Reg. Price.	Our Price.	Reg. Price.	Our Price.
28x2 1/2...	\$12.50	\$7.00	\$3.20	\$2.50
28x3 ...	14.65	10.50	3.65	2.75
28x3 1/2...	21.55	12.00	5.00	3.50
30x3 1/2...	23.15	15.00	5.30	3.50
30x3 ...	15.70	12.00	3.90	3.15
30x2 1/2...	13.25	8.50	3.35	2.75
30x4 ...	31.30	17.50	6.40	4.75
32x3 ...	16.80	10.50	4.15	3.25
32x3 1/2...	24.60	15.00	5.60	3.50
32x4 ...	33.65	18.00	6.85	5.00
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34x3 1/2...	26.80	16.00	5.95	4.25
34x4 ...	36.00	20.00	7.20	5.00
34x4 1/2...	46.65	20.00	8.90	6.00
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36x3 1/2...	29.05	12.00	6.25	4.25
36x4 ...	38.35	18.50	7.55	6.00
36x4 1/2...	48.35	20.00	9.40	6.75
36x5 ...	59.46	22.50	11.05	7.00

These prices are only good while our stock lasts, therefore place your order now to get the benefit of our low figures. TERMS are cash. At the very low prices we are selling them, we are obliged to get Cash with order. Do not hesitate to send us money. We are as good as the bank. All C. O. D. orders must be accompanied with 10% of purchase to cover us on transportation charges.

If you are dissatisfied with your purchase upon receipt of goods, we will refund your money.

SEND FOR COMPLETE LIST

Single Tube Tires 5 or 8 Lugs

26x2 1/2...	\$8.00
28x2 1/2...	9.00
28x3 ...	11.00

By securing a very large quantity of these goods, we are enabled to quote you these extraordinary low prices.

EXCELSIOR TIRE COMPANY

1775-1779 BROADWAY, NEW YORK

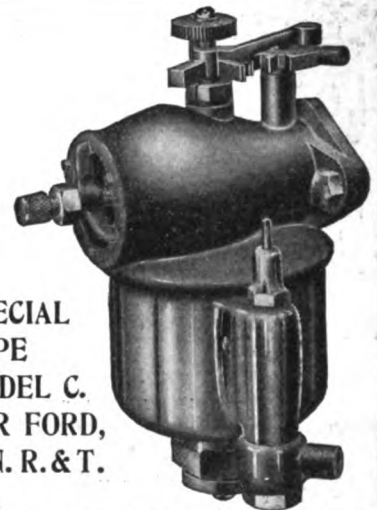
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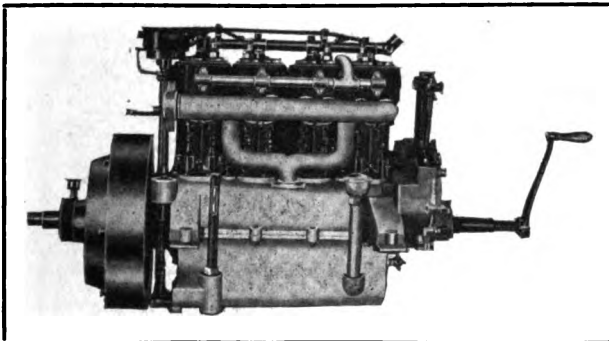
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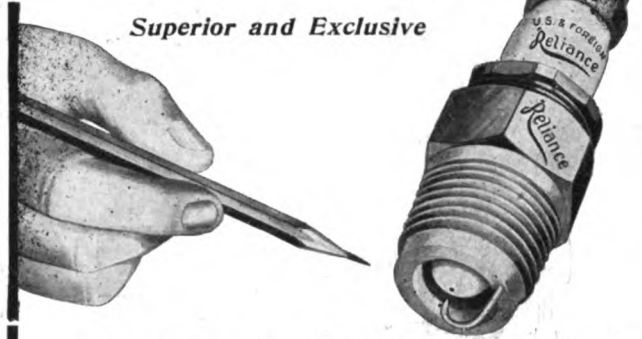
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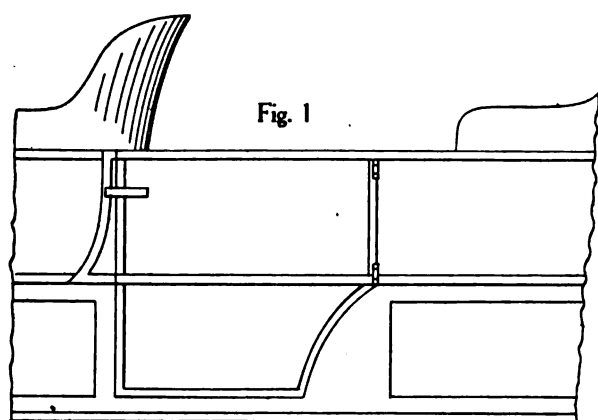
HOW TO HANG DOORS.

It Requires the Best of Workmanship and High Mechanical Ability.

BY AUTOMOBILE REPAIRER.

Illustrations drawn to $\frac{3}{4}$ inch scale.

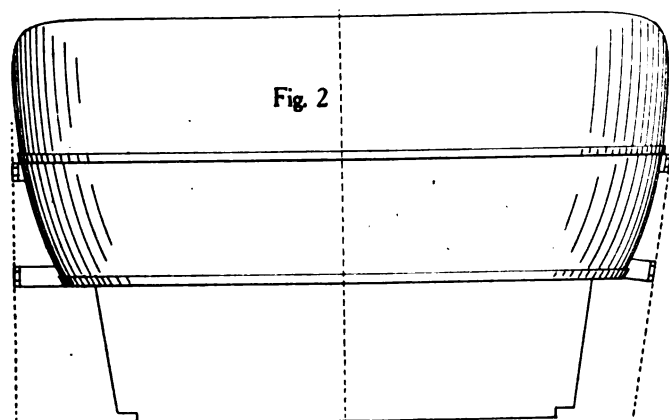
Hanging doors on automobile bodies requires first-rate workmanship and the very best of judgment, be-



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cause the diversity of styles, the various shapes on side view and the different widths, including more and less turn unders on the side surfaces, makes door hanging very complicated. The fenders also must be taken into consideration, as the doors in opening may strike them. It is therefore necessary to use the best of judgment to avoid contacts before the hinges are put on the body and doors.

The expert carriage and auto mechanic, if he wants



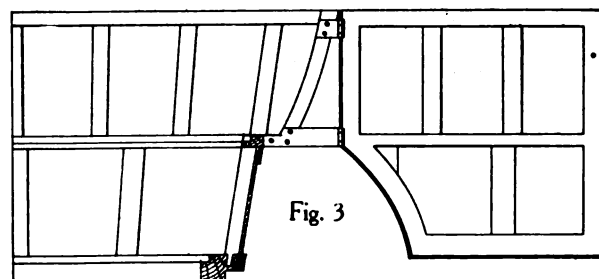
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to know the grade of workmanship on carriage and automobiles, opens the doors, bears on top of the back pillar and sees if there is any wag or rattle in the door hinges. Then he shuts the door to see if there is rattle between the lock bolt and the striker. The

most deficiency is liable to be shown in the lock handle bolts; only one door on five automobiles is fitted perfectly, all the rest are imperfect. The imperfections are many and we will mention some of them:

The hinges rattle in the joints and the hinge pins; on many the hinges are too weak, and especially so when there is a great deal of turn under, and consequently the hinges must be extremely long, increasing the leverage, and this leverage is increased when the hinges are close together. Another defect is that the screws are put in too loose and too short, which is aggravated when the door and hinge pillars are too soft. The result of this is that the doors will sag and the door lock pillars will hit the pillar to which the striker is screwed which catch the lock-bolt and the two pillars will bind every time the doors are closed.

In almost all cases there is not sufficient playroom on the front door joint, and the result is the rubbing of the paint from both pillars, which is an eyesore on otherwise well built automobiles. Nothing is more annoying when the doors are opened and you have to turn the door handle one-eighth part of its required turn before the handle acts on the lock-bolt, which is



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due to the bad fitting of the door handles, and also to the lock-bolt. If the lock-bolt does not work its full length back of the striker the door handle will surely rattle. Again, if the door handles are not well fitted into the square lock hole the door handles will rattle. If there is an empty space between the lock-bolt and the striker the door will rattle. If the lock is on the upper part of the body and the twist or wind of the door is on the wrong side, the door will rattle also. By the above it will be seen that to build a perfect auto door the mechanic must know how to do it.

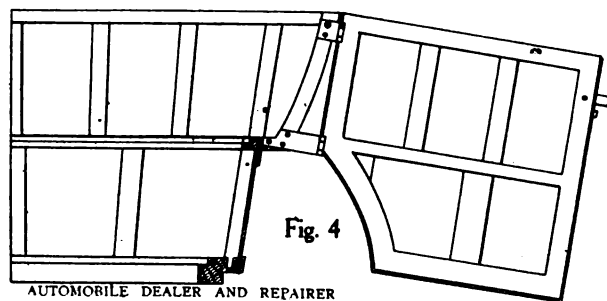
With the aid of the illustrations, it will be seen that the hanging of doors requires the best of judgment, and especially so when there are three hinges on each door, and when two on each door are concealed hinges and the lower one a bent hinge.

Still more difficult are those when two different sizes of concealed hinges are used, including a lower bent hinge. The rule is that all hinge pins must be on a straight line, otherwise there will be strain and this strain will wear on the hinge-pins.

With Fig. 1 we give a sectional view or part of an

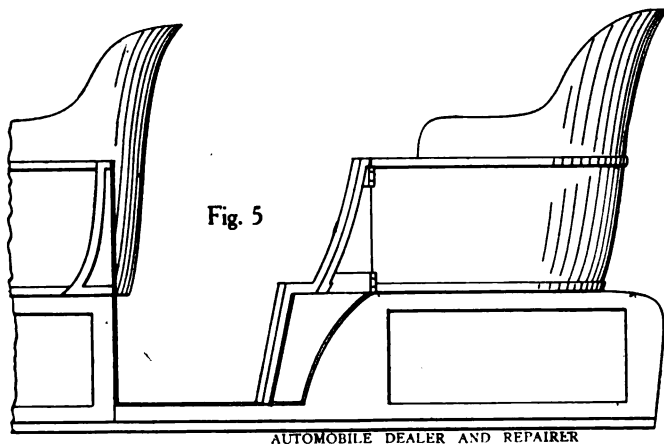
automobile body to show the door closed. On this body the door joint is vertical and so are the hinge-pins in both directions, and when the door is opened the movement around the hinge-pins keeps the door in a vertical position.

This movement is also shown on the left side, Fig.



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2, on which the hinges are fitted square across the body and square vertically. It will be noted that the lower hinge is very long on account of the turn-under which will weaken the hinges. Care must be taken that such hinges be strong, consequently they are made with a rib or wrought iron hinges are used. The most difficulty consists in fastening the hinges to the hinge standing pillars; the pillars excluding the molding is only $1\frac{1}{4}$ inches thick, which is not sufficient to keep such a long hinge in its position. To avoid this the hinges are made of wrought iron and a lap the thickness of the hinge and $\frac{1}{2}$ inch wide is bent over to the inside surface of the pillar and secured with a screw. Such hinges when well fitted will always keep



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the position and will not become loose. Note the right side of Fig. 2, on which the lower hinge is shortened. This is done to strengthen the hinge, because the shorter the hinge the less leverage and the stronger it will be.

With Figs. 3 and 4 we will show the movement of doors with long and short hinges. On both Fig. 3 and Fig. 4, we look at the body from the front with the door open square across. Note Fig. 3 with hinge pins in a vertical direction and note also the top line, which is straight across. Note also the bottom hinge how it extends toward the body to lengthen and to strengthen it. To make it still stronger when the hinges are made of wrought iron the lap is turned around the hinge pillar toward the inside.

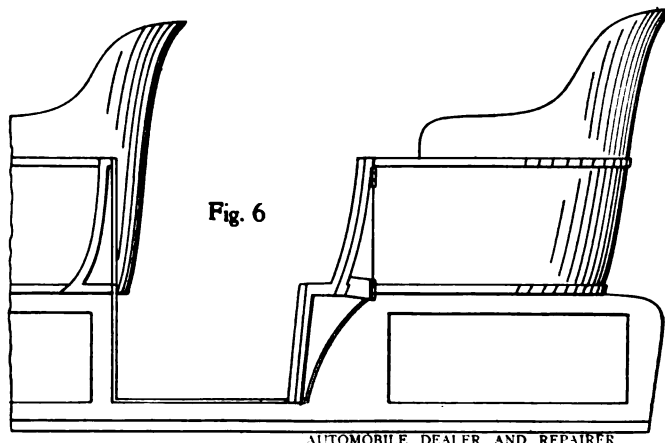
Note the lower short hinge on Fig. 4, also note the position of the door, how it drops from the vertical line. When the door is closed the top of the back pillar is level with the top of the body, and in

opening the door it drops in the position as shown on Fig. 4. If it is turned toward the back or front when in this position it will lift itself again up to the top of the body. This is somewhat objectionable, but it is better than a long hinge.

With Figs. 5, 6 and 7 we show the doors when open, as seen from the side view, and note the result of long, short and bent hinges. The longer the hinges the more the door will be in the way of getting in and out, or in other words, block the entrance.

On Fig. 5 the door when open will block the entrance $9\frac{1}{2}$ inches at the bottom edge of the door. Fig. 6 represents the door open with the short hinges as shown on Fig. 2 and Fig. 4, and blocks the door 7 inches or $2\frac{1}{2}$ inches less than the long hinges on Fig. 5.

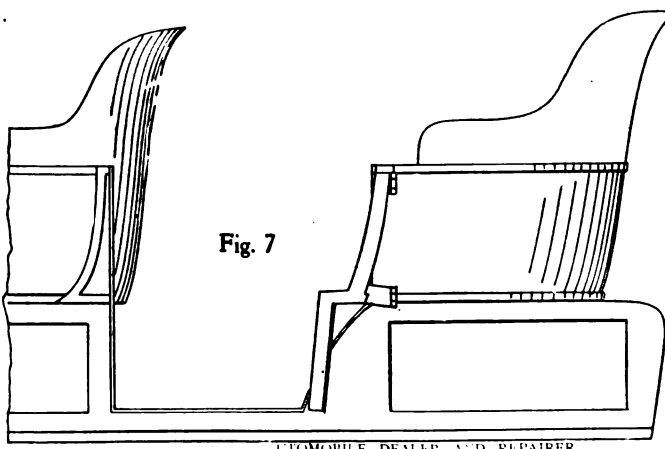
Suppose bent hinges are used in connection with



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the short hinges, or in other words, short hinges bent $1\frac{3}{4}$ inches backward will increase the door space still more and increase the door space the amount the hinges are bent backward. Fig. 7 shows this to good advantage.

Bent and short hinges can only be used when there is sufficient space between the doors and the fenders. Sometimes, and in fact on many automobiles, the bodies are too long for the chassis, and for this reason the door space is shortened as shown on Figs. 1, 5, 6



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and 7, so that when the door opens to avoid the contact with the fenders. If this is the case the bent hinges cannot be used as the doors will strike into the fender line as shown on Fig. 7.

If you find what you want here, please tell your friends about it.

BORE AND STROKE.

Advantages and Defects as Applied to Varied Lengths.

Though a great deal has been written on the subject of bore and stroke of gasoline motors, the writer does not remember to have seen any article which has made it its business to set down from a designer's

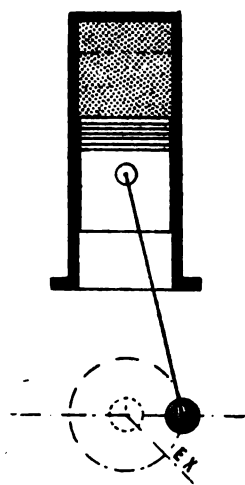


Fig. 1.

point of view the consideration having direct or indirect bearing on the subject.

It is usual to consider the matter from the point of view of horse-power developed only, and it must be allowed that this is the more important side of the question. At the same time, it is not the only side, and, though other points appear chiefly to the designer, all those having to do with the gasoline motor, whether for car propulsion or marine purposes, may care to glance briefly through the subject.

The writer believes he remembers that as a result of tabulating the dimensions of a large number of engines the fact was elicited that stroke should exceed bore by fifteen per cent. This is not, of course, intended to imply that these particular proportions are correct, and that all others varying in either direction are totally incorrect, for it is easy to see that in taking a number of figures of this description it is possible that the average or mean set of figures does not occur anywhere on the list. For example, the average of the figures 1, 2, 4 and 5 is 3, and yet the figure 3 does not occur amongst them.

Then, again, we must be sure that we know what we mean when we say best proportions; do we mean best from the point of view of power, best from the point of view of flexibility, best from the point of view of low cost, or do we mean best from every point of view? If the latter, it is certain that all-round useful proportion cannot be equal in special cases to special proportion decided to suit those cases, or, to give an example, an "all-round" engine would not shape as well as a long stroke one for, say, slow speed marine purposes.

However, these are general considerations, which it is not the intention of the writer of the present article to deal with.

Let us consider, then, first of all the effect of variation of stroke upon water jacket bores, this being perhaps of primary importance. We know that the greater we can make our cubic capacity in proportion to internal surface the better from the point of view

of minimum heat loss, and it will be found that a cylindrical chamber in which the length equals the diameter fulfills this condition best. It is obvious, however, that, owing to the movement of the piston in the cylinder, the proportions are constantly changing; it will be seen that the internal surfaces are at their minimum in proportion to exposed area at one particular point in the stroke only. This point in an engine of about usual proportions occurs after the piston has made about half of its stroke (see Fig. 1), or only a short distance before the period of exhaust valve opening begins. Hence we discharge our power gases to atmosphere shortly after the cylinder proportions are at their best for power producing.

By considerably increasing the stroke in proportion to the bore it will be impossible to improve matters from this particular point of view. For instance, Fig. 2 is a diagram of an engine in which the stroke is twice the bore, and it can be seen at a glance that the best internal condition prevails considerably before the piston has reached mid-stroke position. It may be remarked that in practice combustion engines have not the cylindrical shapes shown in Fig. 1 and 2. This fact will, however, tend to exaggerate the argument under discussion.

One might almost imagine that, discussing the question for the moment from this point of view only, the engine would be the one which the best surface conditions prevailed at or shortly after the moment of ignition—that is, when the temperatures are greatest.

It is certain, however, that provided we do not exceed a certain limit, the long stroke engine has a distinct advantage. This is to an extent borne out by

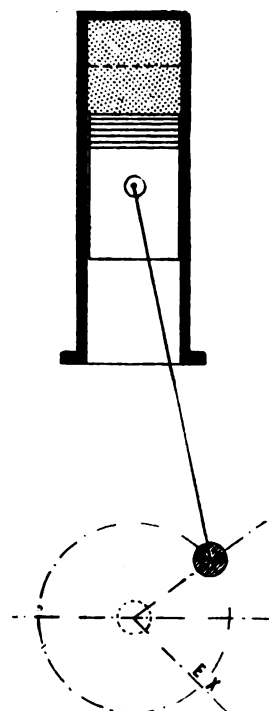


Fig. 2.

the fact that in the case of large internal combustion motors, when economy is of prime importance, stroke usually exceeds bore by about sixty per cent.

The question of weight probably ranks next in importance, and here we are faced with a very intricate problem. A large number of parts have to be considered, and it is no easy matter without going very close

ly into figures to prove anything definite either one way or the other. For instance, the weight of the following parts would have to be taken into account, as their design is affected by alteration in stroke dimensions: Cylinders, connecting rods, crank chamber, pistons, and crankshaft; also sundry smaller parts. The arguments which apply to cylinders apply nearly to the other parts mentioned. Thus with a large cylinder diameter and short stroke we get a short cylinder barrel and therefore a light one.

It is not improbable that an engine having equal

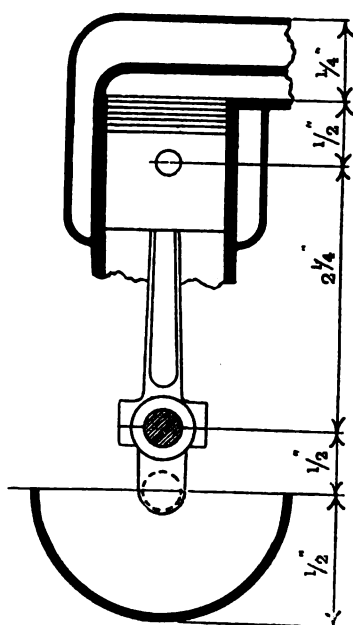


Fig. 3.

bore and stroke would have the lightest cylinder castings, and that alteration of these proportions (capacity, of course, remaining constant) either in the direction of excess of stroke or excess of bore would have the effect of increasing weight. The only method of absolutely proving the question would appear to be for a designer to work over two pairs of cylinders of equal capacity, one pair to have an excess of bore by, say, twenty per cent. and the other excess of stroke by the same percentage. These two pairs of cylinders, having their respective weights calculated on paper, or, better still, weighed up "in the flesh," should provide useful information.

When we look at the question of outside dimensions we have no difficulty in seeing that the long stroke engine will have the greater height and the large bore engine the greater length; width is affected but little. From this point of view, therefore, we have only to consider when we can spare the space more readily. It must be noted, however, that increase of stroke has a greater effect on increase of height than has additional bore on increase of length, for, as a rough example, if we add one inch to our stroke we shall be compelled to increase our overall height by about four inches—rather a large amount—whereas a relative increase in bore should not affect our length more than about one and a half inches. Fig. 3 gives a rough idea of how these four inches are made up, the dimensions shown being the additional lengths required in sundry parts as a consequence of one inch being added to the stroke.

Assuming a maximum allowable piston speed—and it is usual so to do—the longer stroke engine will

make the lesser number of revolutions per minute, and consequently should have the longer life, and another advantage will accrue—the speed reduction between engine and road wheels in the case of a car will not be so great; hence transmissional friction will be reduced.

A point which appeals only to the designer refers to the position of the half-speed-shaft and the valve centre. The writer has noticed that in the case of an engine having equal bore and stroke or an excess of bore the space at the designer's disposal for valve gear is inclined to be cramped; this is shown at A in Fig. 4.

It may even be necessary to throw the camshaft centre further out and away from the crankshaft centre, in order to get more vertical height, as shown at B. Unfortunately, this has an adverse effect in another direction, viz., that the valve pocket is considerably augmented, tending to produce an awkward shape of combustion chamber. In the Knight engine this difficulty was overcome in an ingenious manner. The cylinder centre line and that of the valves, instead of being parallel, are inclined towards one another in such a way as to approach the valve heads themselves nearer to the combustion chambers to an extent which would be impossible were the two centre lines parallel.

One other consideration referring to the equal bore. It is not at all an easy matter to apply a high compression to a short stroke engine, owing to the difficulty of keeping the compression chamber down in size. The valves must have their correct dimensions, and the ports containing them and those communicat-

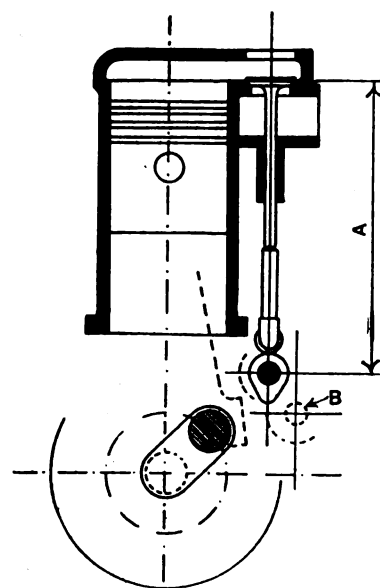


Fig. 4.

ing with the cylinder must have their requisite areas, and we generally find that the port capacity is so large that no, or almost no, compression chamber proper is necessary, the ports themselves providing sufficient space for compressing the gases to the desired pressure. Hence we get a very inefficient shape to our compression chamber. Now this difficulty will be found to diminish in proportion to increase of stroke; the designer will therefore prefer as a general rule to have an excess of stroke over diameter.

There seems to be a rather general opinion that the longer stroke engine has the greater range of expan-

sion. Now, provided we assume an equal cylinder capacity, and we must do so to get a fair comparison, the expansion values will be identical in each case—that of the long stroke engine and of the short stroke engine. This misconception arises apparently from the fact that the long stroke engine has, as a rule, the lower terminal or exhaust pressure, or, as we might put it, a sharper “toe” to its indicator diagram. There are, I think, two reasons for this, but they are not connected with greater expansion. Firstly, as explained above, the long stroke engine exposes a larger proportion of its internal surface at the end of its piston stroke in proportion to the cubical capacity of its cylinder than does the short stroke engine. Therefore we get a greater jacket loss, resulting in a reduction of pressure. Secondly, as the long stroke engine is usually the slower running, the hot gases are longer in contact with the cylinder walls, for its stroke occupies a longer period of time.

As hinted at before, no one proportion is the best to the exclusion of all others, and within certain limits it might almost be considered as a matter of opinion.

SHOPS IN CUBA.

Need of More Tools and Machines and Better Mechanics.

With the advent of modern automobiles in Cuba the past few years, a number of repair and construction shops were established. The writer recently visited some of these shops. In many of them, the proprietor is an American. He employs as many Spanish



A Scene in Havana.

or Cuban assistants as he may require in his business. The usual repair shop for motor vehicles in Cuba is not so completely furnished with equipments of modern description as one finds in the average repair shop. One reason for this is that it is not so easy to get the necessary tools and devices here. And for this reason it will pay the manufacturers and dealers in motor vehicle repair devices to send catalogs to the repairmen of this land. There is a demand and positive need of better descriptions of turning lathes with which to do some turning on parts to be turned down in making a repair job. I watched operations in some of the

shops and noticed that the only metal turning contrivances were little more than old wood turning machines altered over. I saw that much of the work of turning was done by hand-power devices operated by lads. Some of these turning machines were out of order, and defective, resulting in extremely poor work. In one case it was necessary to turn a stud for a waiting motor vehicle and an hour was used in making a poor job of it, whereas with a modern Amer-



Watering the Streets.

ican turning lathe the stud could have been correctly turned in a few minutes.

New motor vehicle repair shops are being established in various parts of the island of Cuba. There are already a dozen or more in Havana and they have plenty of work to do. The army operates a number of automobiles for its various officers in the Quartermaster's department at different points in the island, and these machines need numerous repairs due to the constant and hard work to which they are put.

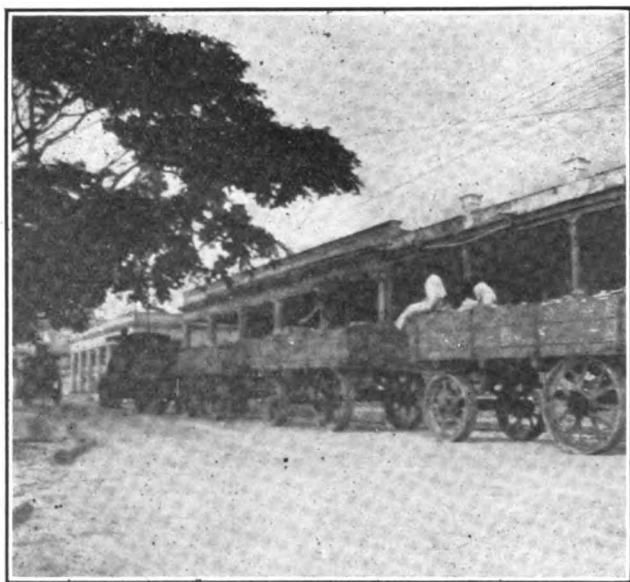
The business men of Cuba are introducing motor vehicles for the transportation of wares. There are already a number of the heavy freight motor vehicles passing through the streets of Havana, carrying products of manufacturers and delivering goods from the wholesale and retail stores. These heavy vehicles are prone to break down like all other vehicles. Therefore it is necessary that there be repair shops. The demand for the same has given an impetus to the artisan of Cuba who heretofore repaired or made other devices. For example, I have in mind a repairing shop of sewing machines, which has been changed over to the more active and lucrative work of repairing automobiles. About all of the shops now engaged in the business are extremely busy. Possibly the tourists help out in the matter to a great extent. As soon as the touring parties arrive in Havana they seek to visit the country in the large touring cars which are held in readiness for this purpose. These cars, like all others of the class, break down in the machinery or break a tire occasionally. It is a part of the business and is taken into consideration when the tour begins. Hence, there are departments of repair for touring automobiles springing up in the various country towns through which the touring parties pass. These shops may be a side line to a blacksmith shop, a wagon shop or other like industrial establishment. Some of the owners of these shops told me that they often derived a very profitable return from their labors by an hour's work on an emergency case in the night or at any hour when a machine happened to break down in their vicinity. The shops carry a few extra parts, but not so many as one is accustomed to see in America.

The lack of proper devices with which to work is

the leading element which makes the shops of Cuba non-effective. This trouble would be overcome if it were made possible to buy what is needed. I am convinced of this, because I spoke with a number of the men who operate shops and was told by them that they would like to put in a new drilling machine, a forge of better pattern, a brazing outfit, a selection of American wrenches, screw-drivers, bits, etc. Ordinary working tools are available in the first class hardware stores of Cuba, but the lines of special tools demanded for fine work on the intricate mechanism of the modern automobile are not carried in stock as a rule. Therefore the motor vehicle artisan is obliged to do the best he can with common outfits of tools. This he oftentimes does to the detriment of the fine working parts of the machine.

Bungling work is very common. It cannot be avoided so long as the repairmen are devoid of tools and devices they need.

The automobile traffic in Cuba is increasing to a point where it makes it necessary to magnify the im-



Drawn by a Steam Motor.

portance of the repair shops. Every day I meet with people who are returning from country tours and who tell me how they came in on the last ten miles on the rim of a wheel, because there was no way to get the tire fixed. I notice many cases of machines being hauled into Havana shops from the country by wagon, trailing behind, hold the sombre parties, simply because there was no shop to do a little job.

In order to help out to some extent, many of the men in charge of motor vehicles carry a repair kit with them. But this is not a satisfactory remedy. You may break down in the night and you cannot see very well to make repairs. You cannot possibly carry the required parts, otherwise you would weigh down the machine too much. You have plenty to do to look out for the running of the machine without going into the repair business.

The bugaboo of narrow streets in Cuba has been overcome to a great extent by the extension of better streets outward to the suburbs, and the motors are run on these. Then the roads through the country have been planned and improved and are suitable for automobile traffic.

New machines are arriving every week. There are

a number of substantial and active automobile clubs organized. The automobile is replacing the horse and carriage in many of the departments of state. The result is, that there is a demand for men who understand how to repair machines and who possess the necessary outfit with which to work. Of course the demand alone will in time result in the establishment of new and better repairing shops. Meanwhile it would not be amiss for any manufacturer or dealer in modern repairing machinery, modern repair tools and devices to distribute their catalogues throughout the island. The commercial directories give the names and addresses of the established shops of repair men. You can send your English catalogue and write your letters in English, because the English language is common here and there is always some one about all stores and shops who can make the required interpretation. R.

TWO AND FOUR CYCLES.

Further Comparison of the Qualities of the Two Engines.

A request has been made for a comparison of the four-cycle and the two-cycle engines for automobile work. This, like a good many other questions, is something of a matter of opinion. It should be recognized at the outset that it is fair to assume that the number of four-cycle engines in use in automobiles compared to two-cycle engines is testimony, if not strong evidence, in their favor.

But possibly some of our readers may not be familiar with the two-cycle principle. In a two-cycle engine the crank case is used to admit the charge while the piston is on the upward stroke. On the downward or working stroke of the piston, the vapor in the crank case is forced through a by-pass by the descending piston, this by-pass admitting it into the upper part of the cylinder, where it is compressed into small volume and ignited at the proper time. The process of exhausting the burnt gases and admitting the new charge are both performed during a single downward stroke, the exhaust port being uncovered first by the piston and allowing the greater part of the burnt gases to escape before the inlet port is opened. Thus in the two-cycle engine an impulse is received with each revolution of the flywheel and main shaft, while in the case of the four-cycle engine an impulse is received every fourth stroke or every other revolution of the flywheel and crank shaft.

The two-cycle engine has been used extensively in motor boats, and it has quite a number of good talking points. Its portholes take the place of valves, which in some ways result in more mechanical efficiency. In addition to this its more frequent working impulses should result in a constant torque and consequently much smoother running. It has, however, been the general impression that the operations of charging, compressing, firing and exhausting cannot be properly accomplished during one revolution, and its power efficiency to gasoline consumed is less than with the four-cycle. But it seems to be gaining in favor slowly, and there is a prospect it may be yet so improved that it will come into more general use for automobiles. Among the cars that now use the two-cycle engine are the Atlas, the Elmore, the Jewel and some others. As showing a comparison with the four-cycle engine from what may be called ex-parte sources, the following from those connected with cars that use

the two-cycle engine, will be read with interest. B. A. Becker, of the Elmore Company, says:

"The two-cycle engine is different from the ordinary type of four-cycle engine in that it requires only two movements of the piston to accomplish the same result of introducing the new charge into the explosion chamber. The piston is a necessary part of any reciprocating engine, either gas or steam, but the two-cycle engine, instead of having a complication of valves and other attendant parts, acts as a valve itself for opening and closing the ports, for the incoming and outgoing gases, on the principle of a plain slide valve steam engine. As it is not subject to wear or displacement, it consequently must remain the same and perform its work for an indefinite length of time without constant resetting or timing.

"The two-cycle engine is the simplest form of gas engine, having only three moving parts belonging to the engine proper—piston, connecting rod and crankshaft.

"It has been said that the two-cycle engine possesses some inherent faults that are not found in the four-cycle engine. It is possibly true that the two-cycle engine has not yet reached perfection nor the limit of progress; the four-cycle engine apparently has and is subject to no further improvement. While the two-cycle engine may not be ideally perfect, it does its work with such nicety and with so little attention or repair that it is the nearest approach to perfection of anything in the gas engine world to-day."

Walter G. Morse, of the Atlas Company, says:

"The two-cycle engine, receiving an impulse with every upward stroke of the piston, gives the necessary multiple impulses to obtain the smooth running with one-half the number of cylinders—is absolutely quiet, all valves, rocker arms, cams, etc., being eliminated and has a maximum amount of power with minimum of weight and space occupied.

"Experience has shown that the depreciation of a four-cycle engine is in excess of 25 per cent. per year while judging by the facts obtainable on the perfected two-cycle engine the depreciation is reduced to the remarkably low rate of 5 per cent. per year.

"Other advantages of the two-cycle engine over the four-cycle are the absence of valves or chambers opening into the combustion chamber with their exposed surfaces, which absorb the heat and pressure from the charge and materially decrease the efficiency of the four-cycle engine; also the absence of carbonization of the two-cycle, there being no carbonization except at the exhaust ports which are easily cleaned. When spark and carburetor are properly adjusted the two-cycle engine will run without missing at a much slower speed than any other type of engine and will outspeed any other type, being capable of over 2,500 revolutions a minute, giving maximum flexibility and variable car speed on high gear. It is not as easily stalled at low speeds as a four-cycle engine, as the transfer of the charge into the cylinders and around the igniter plug is as positive at lowest speed as it is at higher speed—in fact, the engine speed has no effect on the velocity of the charge to the cylinder as it does in a four-cycle engine.

"Extreme simplicity, lack of adjustable parts, low compression and ease of cranking make it an easy engine for a woman or person of little experience to handle. The desirable features of a good four-cycle engine are possessed by a good two-cycle engine in an equal or greater degree."

THE CHEAPER CARS.

How They Are Liked, and Their Comparison with Horses.

Speaking of the comparative merits of low-priced cars and horse-drawn vehicles, a Brooklyn physician says:

"I have used my one-cylinder car—it might be invidious to specify the particular make alluded to—during four years, running it about the village on an average twice a day, and for an average trip of twenty miles once or twice a week. Practically, the car has been in constant use during eight months of each year. I have lost only one tire and had only one smash-up and the total bill for repairs and replacements would be about \$50. The fuel expenditure for batteries, gasoline and cylinder oils has averaged 75 cents a week, or, speaking roughly, \$25 a year. The total cost of purchase and upkeep may be put at \$700 for four years.

"A horse and buggy of the cheapest type," the owner continued, "would have cost just about the same; say \$150 for purchase, \$100 a year for feed and upkeep and \$50 for repairs and shoes. It is true that a horse is serviceable in winter when a small car may not be. On the other hand, my actual experience is that it is cheaper to use a runabout and hire a horse and trap for the three months of snow. The reason is that a horse requires an attendant as well as food, and no matter whether it is only a boy or a woman, that attendant is going to cost dear—about as much again as the feed of the horse.

"There is also loss in the time of hitching up and in the stabling. The first year I had my car I kept it out of doors all the time, under a big tarpaulin, as I was retaining my horse. During the first year, I may as well acknowledge, it usually took me twice as long to start the car as to hitch up the horse; but since then I never have a moment's difficulty except at the approach of winter, when the water jacket is liable to freeze if not emptied and the gasoline is somnolent. When I had a horse I was tied to my home; someone must always be there to attend to it, whether it was in service or not. Now, with a car, I need no attendant and have no anxiety about the care of my horse when I go away.

"A further important consideration," the doctor concluded, "is that my car is fit for another four years yet, since, with the care which becomes customary, I am wearing it very little."

This was said of one of the old makes having a single cylinder, obviously the most conservative in fuel consumption and substantially built.

Linoleum for Car Floors.

Linoleum is, it is contended, an ideal floor covering for automobiles. No dust or disease germs can lodge in it, and it can be cleaned and purified in a few minutes with a damp cloth. It is by no means a crude fabric, as most beautiful effects, new art styles and small tracery designs can be purchased. Linseed oil is its largest and most expensive component, cork being added to fill out the jellylike oil and give it body to stand mechanical wear. Linoleum is unaffected by gasoline, impervious to moisture and resilient to the foot and never becoming slippery with wear. A coating of linoleum cement applied once a week or at slightly longer intervals will insure its practical indestructibility. It costs something like 50 per cent. less than rubber, which it gradually will displace to a large extent.

Automobile Dealer and Repairer

A Magazine of condensed and compact information for busy readers.

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ADVERTISING RATES MADE KNOWN ON APPLICATION

NEW YORK, APRIL, 1909.

Missing Numbers—Our readers are requested to remember that it always gives us pleasure to re-send numbers which have gone astray in the mails.

THAT CRYPTOGRAM.

Upwards of fifty letters have been received in relation to the "cryptogram" or illegible postal card printed in the March issue, and in most of them either serious or pleasantly facetious solutions were made. It may be stated that the larger number of the translations appear to be nearly correct, or at all events, near enough for "practical purposes." But as it was stated that the honorarium would be given to "the first who will send in a correct and full transcription of it," this must be taken as a standard in making the award, and we find—as far as editorial judgment is of avail—that it should go to Dr. F. S. Smith, of Nevada, Iowa. Dr. Smith's translation is as follows and it is probably correct:

"There is no Colles fracture known to doctors. In Colles fracture there is no fracture of the ulna. This sort of thing shakes confidence in your very sure way of discussing other topics. You seem, too, to be committed to the interests of graft prices and methods."

Quite a number of other readers gave a translation almost identical to the foregoing, but it was the first absolutely correct solution received, and it may be stated that the doctor must have sent it to us almost immediately on receipt of the magazine. He adds: "You may apply my \$2.00 to subscription to the magazine. Send me a hard one next time." And with thanks, Dr. Smith's subscription is thus marked up accordingly.

Some of the translations are rather fanciful. This, for illustration: "This is no cow's pasture. When it fetters in cow's pasture then is no pasture. Of this we no. Yes, but if tying makes awful pain, then very sure way of discovering other tyers. For sum of 100 to be emitted to this in tents if grass fields & meadows."

Here is another solution wherein untrammelled imagination has an inning: "There is no coils friction known to jointing. In coils positive there is no fric-

tion of the inner wire or out, by anything. Makers complain of a very sure way of discussing other topics. You lessen good autocraft to be committed to the interest of prices or methods." The author of this reply adds that "the first part of card impresses me as an answer to something in the trouble department; the latter part of the card a compliment to the AUTOMOBILE DEALER AND REPAIRER magazine. I enjoy reading it myself."

Another reader who sends in an absolutely correct transcription except that he adds a comma after the word "graft" in the last line, and who otherwise on the ground of priority would have been entitled to the prize, adds: "I would suggest that you take up a collection for this sore-headed doctor and present him with a typewriter. For if he uses this same kind of chirography in writing his prescriptions that he does in writing his automobile suggestions, the undertaker must be his warmest friend."

Thanks are returned for the interest so many of our readers have shown in this matter. It is from them that we learn that a Colles fracture is a fracture of the radius, about an inch above the wrist joint. It may be remarked that our anonymous cryptographer complainant who so puzzled the editor, probably referred to a paragraph in our December issue, which may justly be criticized, although he is rather severe to accuse us of "graft prices and methods." Deponent has been an editor for some 30 years, and during this time, to paraphrase a line or two of an old sage, "his cares and inquiries have been for decency and truth," and in this he has been wholly occupied—making mistakes and correcting those of others, but at all times spreading information and the truth—for "the truth shall make you free." As to graft, our accuser, who hides behind bad penmanship and anonymity, is informed that we do not care to add to a recent remark in this column that it ought to "die the death of a dog."

IGNORANCE OF THE LAW.

It has been stated, and it is true, that the number of reckless automobile drivers is comparatively small. Most drivers are careful and mindful of the rights of other users of the streets and highways.

But we are bound to say that there are quite a number of car owners and drivers who do not fully understand their duties and responsibilities, although their intentions are good enough. Take a recent case of accident in Boston, for illustration. A man and his wife and his chauffeur were riding at a medium speed and while turning from one avenue into another the car struck a man and fatally injured him. The owner of the car has stated that he does not think the chauffeur was to blame. "The alarm was sounded," he says, "but the man did not step fast enough and was struck by one wheel."

It should not be forgotten that pedestrians are not required to "step fast enough" beyond their normal speed to get out of the way of approaching automobiles. The driver of an automobile (this is not the opinion of the editor, merely, but the mandate of the law) is bound to anticipate that he may meet persons at any point in a public street or highway. He must, therefore, keep a careful watch for them and have his car under such control as will enable him to avoid injury to any one, and if necessary, he must slow down and even stop. This has been decided by the courts. An adult or an infant has the right to assume that the operator of an automobile will exercise care and re-

spect the rights of pedestrians when there is occasion to turn a corner.

This being the law, it must be admitted that in the case in question the chauffeur was clearly to blame, although not so much from carelessness or wilfulness as from ignorance of the rights of other users of the highways.

NO PROTECTION FOR DEALERS.

Instances of arbitrary action on the part of car manufacturers in their relation to agents still continue. These illustrate better than generalities the absolute necessity of the organization of dealers for self-protection. No one can afford to undergo the expense of establishing a garage and salesroom, advertising and otherwise preparing for a more or less permanent business, with the possibility that it will be taken away from him at any time.

At this writing we have in mind a case where the agents of a car last year were given to understand that unless a deposit were made the contract would not be renewed. At first a deposit of \$300 was required "as an evidence of good faith," etc. Finally the company agreed to accept \$100, but the agent rightly demurred to even this, advancing as one reason that he needed the money in his business, and as a further fact that he had been put to a heavy expense in maintaining a garage and advertising the car, and that if this was not sufficient evidence of good faith, the deposit would not prove it. But the agency was withdrawn and given other parties. In a letter to the editor of this magazine the victim, who has been in the vehicle business for some time and naturally knows something about the trade, says:

"The information we send you is not given in any hope of benefit to us, but we have in mind other dealers who might be forewarned by the citation of this concrete example. Even granting for sake of argument that the automobile company had cause to be dissatisfied with our representation here (which they have not even alleged), their method of changing agents cannot be considered other than as very unfair. This city, considering its size, has had less of the automobile spirit and fewer automobiles than any other town of its population that the writer knows, and the greater part of our work since last fall has been of a missionary order. We had the definite assurance of quite a number of orders early in the spring, and eleven of our prospects have already purchased cars since the first of February. It seems rather hard, therefore, not only to lose the fruits of our labor but also to suffer a financial loss of over \$750 for the privilege of having represented the automobile in question."

To an open mind the foregoing treatment may be termed "pretty tough." Ordinary contracts are supposed to be made out for the purpose of protecting all the parties involved, and they comprise an interchange of legal rights. But it seems as if some contracts, at all events, of agents for the sale of cars have legal rights expressed on one side only.

Quite likely the victim in the case referred to has no redress, but this makes it all the more imperative that car dealers everywhere should become members of the National Dealers' Association. Meantime, the association should take up this question of contracts and have one prepared for use that does not place all the obligations and penalties on one side and all the benefits on the other.

A SLIGHT FAVOR.

We trust our readers will not feel we are asking them to do too much when we request that when they write for a circular or a catalogue of anything advertised in the *AUTOMOBILE DEALER AND REPAIRER* they mention the name of this publication.

A great many people write letters to advertisers without thinking that it makes any difference to the advertiser where his advertisement was seen or to the publisher either. It makes a great difference to both. The advertiser wants to place his announcement in a publication that will bring in inquiries and results. The publisher wants his paper mentioned because that's the only way the advertiser can know that his announcement is doing him good.

Most readers do not appreciate how much they are indebted to advertisers for cheap publications. For instance, it would be impossible to publish the *AUTOMOBILE DEALER AND REPAIRER* at four times the present subscription price if it wasn't for the advertisements.

We hope our readers will look over the advertising columns and if they see anything they are interested in we ask them in writing for a circular or a catalogue to mention the *AUTOMOBILE DEALER AND REPAIRER*.

A Lesson to Dealers.

Editor the *AUTOMOBILE DEALER AND REPAIRER*:

As an illustration of the need and value of organization the present tariff squabble affords a good example. Every line of industry and every interest is trying to avoid a reduction or to obtain an increase in duties, and with congress sure to follow the line of least resistance, it is easy to forecast the result.

The big corporations with their great organization in and out of politics will not suffer much. Indeed, some expect to benefit from the change in the tariff. Here are our friends of the licensed and unlicensed Association of Manufacturers, who usually find plenty to disagree about. The moment a common danger threatens the industry all internal quarrels are forgotten and a united front is presented. For months men have been gathering statistics both here and in Europe showing the relative cost of material and labor in the automobile industry, and consequently the manufacturers are able to present their case to congress in an intelligent and forceful way that no doubt will carry weight with the lawmakers.

The need of organization is no longer desirable; it is an absolute necessity, and the writer predicts that unless a strong organization is perfected and substantially supported the retail automobile dealer will gradually find his business disintegrating.

From every side this business is being undermined. The manufacturer, the jobber, legitimate and otherwise, and lastly but by no means least, the public, is getting to consider the dealer as a more or less unnecessary adjunct to the automobile industry. And so this great line of business is gradually being destroyed simply because the dealer is foolish enough to allow everybody to walk on him.

How different all this might be and how simple the remedy is should be and no doubt is realized by the great majority of the dealers themselves.

Wake up, dealers. Join the one existing National Association of Retail Automobile Dealers. Support it and work for it.

With a strong association, the dealer will be able to assert himself and to dictate where he now is barely tolerated. Do not sit still and expect a few men

to do it all. Forget your local jealousies for the common good. Interest your fellow dealers and let us get together or it will not be long before we will have to look for another vocation.

JUST A DEALER.

LESSONS FOR DRIVERS.

Carelessness and Ignorance Responsible for Most Accidents.

Public feeling in relation to automobile accidents has never ran so high as during the past month. As far as this applies to New York city there is reason for it. The killing of four children in five days is but one incident of the matter which is calculated to inspire lawless retaliation on the part of the rabble. Indeed, one of the New York city papers claims that murder by automobile is safer than by the pistol or knife because the high speed of the car enables the culprit to get away. What makes the matter decidedly worse is the fact that in some cases of accident both women and men automobile passengers have urged the chauffeur to put on all speed and get away. One New York paper remarks that the "streets of New York are not suitable for automobile speeders." Very true. Neither are streets of New York suitable for playgrounds for children. Another paper calls for the number of the car to be "painted conspicuously on the body in figures a foot high." But as a rule, if the pedestrian has opportunity to note the number of the car he has also the opportunity to avoid being run over, and if he is being run over he has no opportunity to make a note of the number of the car.

But who can name a better remedy than bigger figures for the number of the car? Will our thoughtful readers suggest something? After a little reflection it will be admitted a serious problem. It has been suggested that a long term of imprisonment will put an end to the evil. We very much doubt it. The unscrupulous and reckless drivers are less than a tithe of the whole, but they will take even greater chances than at present of escaping if the punishment for their recklessness be made more severe. Moreover, although the road rights of the man on foot and the rights of the man in the driver's seat are equal, yet pedestrians have duties as well as rights, and they have no more right to use the highways for anything except travel than the car driver has to drive recklessly.

Possibly the trouble will not be finally settled until there are highways made exclusively for automobiles. A rather drastic and revolutionary remedy, we must admit. But who has a better plan?

Accidents for the past month have been unusually numerous and flagrant, both as to carelessness shown by car drivers and by pedestrians and other users of the highways and streets.

His Coat Caught in the Shaft.—A heavy racing car was speeding along near San Francisco, Cal., at the rate of about 80 miles an hour. It suddenly darted across the street at a sharp angle, leaped into the air, turned somersault and landed 60 feet away. The driver was hurled into space but he escaped with a few broken bones and bruises. The car will need new spokes and tires. The accident was due to the coat of the driver having in some way caught in the shaft.

Caught in a Pocket.—In Sacramento, Cal., an automobile was being demonstrated by an alleged expert chauffeur. There were four in the car. It was going at a far too rapid rate, of course. Suddenly the driver

found himself in a pocket with vehicles at the right of him, at the left of him and in front of him. He had nothing to do to prevent a head-on collision except to take the curb. The car was about demolished and the passengers were thrown out in every direction. One woman was found unconscious with her jaw broken and the flesh torn from her face. If the car had been going at proper speed the accident would not have happened.

Driver Dashed Away.—Near Birmingham, Ala., a man got out of his wagon to fix his load. Just as he reached the rear of the wagon a car came along and he was hurled into the ditch badly bruised. Instead of stopping, the chauffeur put on speed and dashed away. Two men and a woman were in the car. The victim does not know its number but he says he will find the guilty parties if it takes him the rest of his life.

A Hat as Evidence.—A car was racing near Kansas City, Mo. It struck a carriage coming in the opposite direction head on. The occupant of the carriage was thrown out, the carriage was reduced to kindling, and the chauffeur sped on, taking some of the broken parts of the carriage with him but losing his hat of brown felt. Detectives are looking for the criminal.

Chauffeur Speeds Away.—While at play on roller skates in New York city a lad was run down by an automobile containing two women, who urged the chauffeur to put on all speed and get away. This he did. The recovery of the lad is doubtful and so is the apprehension of the guilty women.

Gasoline Tank Exploded.—Near Palm Beach, Fla., a car was overturned, pinning the two occupants beneath. Then the gasoline tank exploded, scattering the burning fluid over the men. One managed to extricate himself, but the other was burned to death.

As he stepped from a Trolley.—In Harrisburg, Pa., a man was run into by a car as he stepped from a trolley and was taken to the hospital suffering from concussion of the brain.

Little Girls Run Down.—While returning from Sunday school in Philadelphia recently two little girls were struck by a car and one was almost instantly killed, having been hit by the mud guard and the car passing over her little body. The other was seriously injured. The driver hurried to the hospital with the victims and then gave himself up to the police.

Steering Gear Collapsed.—In Louisville, Ky., a car containing a physician and his brother struck a tree, the steering gear having failed to respond. The car was wrecked but the men were not much hurt.

The Car Swerved.—In Kansas City, Mo., the driver of a car in which was his wife in some way lost control of the steering gear. The car swerved, ran into a telephone pole and snapped it in two, threw the passengers out and injured seriously one of them. The car was not entirely ruined.

Tire Mileage.

"Around the World on Firestone tires" is the suggestion made by a sworn statement of motor truck tire mileage which was exhibited at the Firestone booth in the Boston Automobile Show. This unique affidavit was made by A. Goyert of Greensburg, Ind., setting forth in legal terminology that the two rear tires of his truck each saw 25,000 miles service and the front tires 31,000 miles. Every one of the set traveling enough road to encircle the world. The rear tire which was on exhibition is worn down to the cross bars, but its base remains intact.

THE REPAIR SHOP

CYLINDER LUBRICATION.

Height of Oil for the Splash System and Importance of a Good Quality.

BY SYDNEY F. WALKER, M. E.

In the lubrication of cylinders of motor engines, the problem, though similar in some respects to that of the lubrication of axles, is very different in others. In the axle, a lubricant employed is not, or at any rate should not, be exposed to heat. When heat arises, it is a certain sign that lubrication is bad. On the other hand, in the case of the cylinder, heat is necessary to the working of the engine, and the temperature to which the lubricant is exposed varies from instant to instant, and this has a very important bearing upon the kind of lubricant employed, and upon the method of employing it.

It will be remembered that the temperature of the hot gases produced by the explosion of the charge, is somewhere about 2000 degrees F., while the whole of the cylinder assumes a temperature of about 300 degrees F. It is important therefore that, as explained in a previous article, the lubricant employed, should be able to stand a temperature of 300 degrees F. and over, without evaporating.

In lubricating the cylinder by what is called the "splash" method, the crank pin and the piston itself, receive their lubricant from the same source, viz., a pool of oil in the bottom of the crank chamber. The cylinder, it will be remembered, forms with the crank chamber, a closed vessel, and this is taken advantage of, to cause a continual splashing or spraying of the under side of the piston, by the aid of the moving crank. In practice, the crank should just dip into the pool of oil as shown in Fig. 1, and should carry a small quantity up, as it rises, and fling it onto the under surface of the piston. The crank pin gets its own lubricant, by dipping into the pool, and therefore does not require any special care.

The important question however of the lubrication of the piston itself, of the interposition of a film of lubricant, between the piston rings and the walls of the cylinder, are dependent upon the efficient working of the splashing arrangements. If the pool of oil in the crank chamber is too low, so that the crank cannot carry the proper quantity up to the piston, the lubrication of the piston suffers. If, on the other hand, the pool is too deep, so that the crank shaft churns around in a body of oil, as shown at A, Fig. 1, the efficiency of the engine suffers, friction being set up between the crank and the mass of oil, and in addition, a larger quantity of oil than is required, being thrown up to the piston, a certain portion of it that is not required for lubrication, finds its way into the explosion chamber and is burned, on the explosion stroke, the result being the blue offensive smoke that is sometimes seen issuing from the exhaust of motor engines.

Another trouble may arise if the lubricant is too thick. It will become thin with work, and from the heat of the engine, but meanwhile considerable damage may be done to the piston by the lubricant not finding its way properly into the small space between the piston and the cylinder walls. As usual, practical

experience is the only reliable guide. The motor repairer would be wise to make himself acquainted with the different kinds of lubricants used in crank chambers. Manufacturers of motor cars have been obliged to find out, sometimes by very painful experience, the best kind of lubricant for their engines.

A cheap lubricant is usually not a good one. The lubricant for the crank chamber must have a certain body in it. It must maintain its liquid form at the temperature of the cylinder; it must have sufficient viscosity to stand the temperature, and above all things, it should contain no vegetable or fatty acids. As it has been explained in previous articles, the

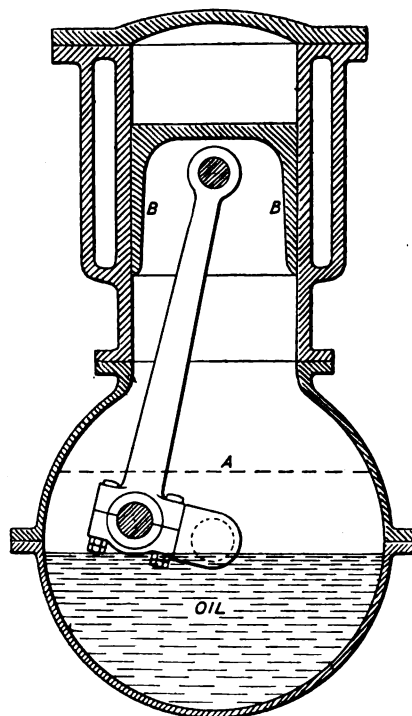


Fig. 1.

whole art of preparing lubricants consists in cleansing the primary substance from dirt, and from other substances that are present, such as the acids. The cleansing is carried on by a succession of processes each costing money. Cheap lubricants usually have not had the cleansing process carried sufficiently far.

The lubricant finds its way into the cylinder itself by creeping down inside the piston at B B, in the well known manner, then over the lip of the piston, and then up between the piston and cylinder walls by capillary action. The motion of the piston carries the small quantity of lubricant that has reached this part of the piston surface up into the cylinder, at each stroke, and efficient lubrication means the carrying up of just enough at each stroke to keep the film between the piston rings and the cylinder walls constant. There is a small waste of oil which has to be made up, either by continuous or periodic additions.

Even with the very best cylinder lubricants, certain troubles will arise, and therefore the motor repairer

will be wise to examine the oil in the crank chamber whenever a car comes for repair. Even the best oils contain small quantities of substances that form carbon in the process of working, carbon being deposited upon the cylinder walls and leading later on, if allowed to accumulate, to pre-ignition. In addition, it is difficult to prevent dust from entering the cylinder, on the suction stroke, with the air. The best gasoline contains small quantities of foreign matter, as the strainers in carburetors bear testimony. All of this tends to dirty the oil in the pool, and dirty oil is a bad lubricant. If the oil in the crank chamber has a dirty appearance when examined, it is safer to remove it and put in a fresh quantity. Practical experience is the very safest guide in this matter. The man who has motor cars constantly passing through his hands, will get to know quickly how much each kind of car will stand in the way of dirt in the crank chamber lubricant. Some engines are very good-natured. They will go on working with a comparatively large quantity of dirt between their working surfaces. They are not usually very efficient, in the sense of giving a large quantity of power for a given expenditure of gasoline, but they do not come too often for repair, and are more easily kept going than the more efficient engines. Engines in which the fitting is very good, must have very good lubrication, and in those engines, the motor repairer will be wise if he is allowed to do so, to draw off the crank chamber oil immediately it looks dirty.

CLEANING THE HANDS.

The Beginning and the End and All There Is to the Subject.

BY JAMES F. HOBART, M.E.

When a man crawls out from underneath a car, particularly if he be in a hurry and the car is not, it does not add to the humor of the occasion if his hands are covered with black grease or other substances which seemingly "sticketh closer than a brother." To get out of such a condition as quickly as possible, put a little gasoline on the hands, rub it quickly over the dirty parts then rub off with cotton waste, or a rag. A second application of gasoline will remove much of which does not come off the first time. Some people object to using gasoline on the hands because it seems to leave them harsh and dry after such an application. This is because of the removal of all the natural oil from the skin. A remedy is to rub into the skin a little oil after the gasoline has been wiped off or has evaporated.

Any good clear oil may be used, though some people prefer to use vaseline upon the flesh instead of oil. After having performed a soldering operation, particularly where acid was used as a soldering solution upon iron surfaces, it is found very hard to clean the hands. Soap has little effect upon the coating of resin, dirt and muriate of zinc which has collected upon the hands. The use of gasoline in such cases dissolves the resin, discourages the acid and enables soap and water to get right down to business and take off the remaining dirt in short order.

The hands may be quickly cleaned temporarily by washing them with common lubricating oil. No matter what kind is at hand, pour a tablespoonful in the palm of one hand, then with the other hand, smear the oil quickly over all the spots of grease. Keep working the oil over the flesh, rubbing the blackest spots with a thumb or a finger, and the oil will dissolve the black grease very quickly. Wipe off the oil with

waste or a cloth, then apply a second lot as before and the remaining grease will quickly yield to this application. Paint may be quickly and easily removed in this way, and kerosene oil is mighty good for that purpose. The use of oil leaves the hands very soft.

HOW TO WASH THE HANDS PROPERLY.

Probably not more than one person in twenty-five knows how to wash the hands in the shortest time, with the least expenditure of energy and soap. The usual method, which you may see attempted almost any day at hotel or garage, is as follows: A little soap is rubbed lightly on the hands, then they are plunged into a big bowl of water and rubbed vigorously, coming out with only a little of the grease removed where the soap had "hit the high places." This is all wrong. Follow the directions given herewith and you can clean the hands very quickly, even with cold water, although warm water is the best and works a little quicker than cold water.

Take the soap between the fingers and plunge both hands, soap and all, into the water so as to wet the hands as far up the wrists as the washing is to go. Next, get back away from the water. You want no more of it for the present, but rub the soap well with the palms of both hands, dissolving off a lot of the soap and trying to get a lather all over the hands. The grease will begin to come off and the lather will be black instead of white, and it will soon disappear, leaving a thick black creamy looking mass on the hands. When the stuff gets so thick that it does not rub around easily, then go to the water again, but do not plunge the hands into the bowl or basin—not yet, but soon.

Just scoop up a very little water with the fingers of one hand. Only a spoonful or two will be required—just enough to thin the black mass on your hands, but not enough water to cause it to drip off. Continue the rubbing, giving particular attention to the spots of black grease which have not yet yielded to the soap-rubbing treatment. Unless there be plenty of soap on the hands, the grease cannot be all dissolved. But if plenty of soap got rubbed up at the beginning, then all the grease will soon go into solution.

NOW FOR THE WATER.

When there can be seen no more grease marks as the black soap-cream is brushed aside by the fingers, then you are ready for the water basin, but not one moment before that. Make sure that the black spots have been all removed or that the soap has all been absorbed by the grease. In either case, plunge the hands into plenty of water and see how quick all the black stuff comes off. It leaves the flesh as quick as the water touches it, and if the soap has been plentifully and thoroughly rubbed about, not a particle of grease will be found upon the hands.

When an insufficient quantity of soap was rubbed up, the grease cannot be all dissolved or saponified by the alkali in the soap. In this case, a second application of soap must be made, proceeding exactly as first described, using no water after enough has been applied to wet up the required quantity of soap. Then, keep away from the water as before, except for the little reinforcing amount. Rub in well and then wash away grease and dirt as before, with plenty of clean water and—the job is done.

WASHING VS. WIPING.

The average automobilist, as far as washing the hands is concerned, may well be classed with the boys

who were described by their mother as "Not being of much account at washing, but they certainly were elegant wipers!" But wiping is not washing, and it does not remove the dirt and grime from the pores of the flesh. In order to get the hands clean, they must be washed as described above. If water be applied as soon as the soap has been touched, the washing can be done, but it will take many times as long, besides using—or wasting—a good deal of soap.

THE CHOICE OF SOAPS.

A man can clean his hands with any kind of soap. So, too, he can make a meal of any kind of food, but sometimes neither operation is at all agreeable. The very strong-of-alkali soaps are not desirable, for they make the hands rough and sore. The so-called "resin" soaps work well. These soaps may be distinguished by the faint smell of pitch or pine resin which is present during and after the washing. Borax soaps are good. They do not make the hands sore and give quick results. The "grease" soaps may be distinguished by that greasy, tallowy feeling in the soap and on the hands after washing them with these soaps. Washing cannot be done with any comfort with these soaps when there is heavy dirt on the hands, but such soaps are excellent for washing after the hands have been cleaned off with gasoline as described in a preceding paragraph.

THE SOAP POWDERS.

A package of soap powder is one of the best washing articles the autoist can carry. But in the form of a powder, it is not at all convenient. The best way to utilize soap powder is to place a quantity of the powder in water, heat and stir until the powder has completely dissolved, then set aside to cool. If the proper quantity of water has been used, the contents of the dish after cooling will be found to be a thick firm jelly which may be easily scooped out of a dish with the fingers, but which will not run out, or fall out when the dish is upturned. Pour the hot solution into tin or aluminum salve-boxes, one of which, placed in the auto-kit, will furnish all the washing material necessary.

HARD AND SOFT WATER.

The autoist will find all the difference in the world in washing with the water in various parts of the country, and where dirt will come off with little work where pure soft water is found, there is a good deal of labor connected with washing in iron-impregnated waters found in some portions of the country. Take the water in the little city of Greenville, Ohio, for instance. If that city, or the county in which it is located, ever "goes dry" it may be set down as an unbearable hardship. The Irishman defined water as "Thot sthuff which is afther being good to wash in but there's too miny dhrouned in it to be drinking it!" That is the case with such water as Greenville and many other towns place before the unwary traveler. When obliged to wash with this kind of water, one can only supplement the soap jelly with plenty of time and patience. The soap will curdle and pass away, but you must keep right on, soaping and rubbing until either you or the dirt becomes discouraged.

SEA SOAP.

There is a kind of soap made expressly for very hard water, and for use with sea water. This soap contains ingredients which neutralize the salts contained in very hard water. Sea water in particular, is what the sea soap is designed for, but it works equally well in most other very "hard" waters. Sea soap is not

desirable in soft waters, for the strong chemicals which neutralize salts of sodium and other metals in hard waters will act too strongly upon the hands when these salts are not present in the water. Therefore, if you put a bit of sea soap in your auto kit, never try to wash in soft water with that soap. It's too harsh and strong for that purpose.

SOAP PAPERS.

For the use of automobilists there has long been on the market little books, the leaves of which are thickly coated with soap. It is only necessary to wash with this paper, to wet the hands and a leaf torn from the soap-book. Then rub in the usual way and the soap will come off the paper upon the hands. There is enough soap on one leaf to wash the hands thoroughly if not too badly covered with thick oil or grease.

OTHER DIRT CHASERS.

Numerous preparations of grease-removing soaps are now to be obtained in various forms. The most common seems to be in little tin boxes 2 inches or more in diameter, and of various depths. Some of these preparations are villainous in the extreme and the autoist will do well to steer clear of them. This applies particularly to that class which is full of powdered glass or some other substance which cuts the hands all to pieces when rubbed over them. Some machinists are addicted to the use of these preparations, but they should be avoided by the soft-skinned man, or the one who likes to have nice-looking hands. These preparations are too coarse for the use of the average man who is looking after something for cleaning the hands which have been soiled in automobiling.

WHAT STAINS THE HANDS?

After some operations in which the hands have come in contact with grease from certain parts of the automobile, it seems almost impossible to get the dark stain out of the skin. It seems almost as if it had been tattooed into the flesh, and is about as hard to remove. Only vigorous scrubbing with a brush seems to make any impression upon this kind of dirt, and sometimes I have been obliged to use the brush and gasoline to get the stain out of the skin on the backs of the fingers. But this way is fierce. If followed up often, it will surely make the hands very sore.

The cause of staining, as above described, is the finely divided steel contained in the grease. This kind of stain comes usually from bearings which are subject to a great strain and a good deal of wear. The wrist bearings, the guides, the main shaft bearings are all to be depended upon for staining the hands badly when one has to work in the grease which exudes from them. The metal is torn by friction from the surface of bearing or journal and it comes into the grease in the most finely divided condition imaginable. So fine are the particles that they penetrate the pores of the skin very readily, and it is almost impossible to get them out again. It is the presence of the metal particles in the flesh which give it that grimy, dirty appearance, peculiar to the hands of every metal worker. The metal which comes from bronze or bab-bitt bearings is bad enough, but it does not stain as badly as steel particles. And steel is even worse than iron.

THE "OUNCE OF PREVENTION."

When a man gets out of his auto for a trip via the Stomach Route to Road dust and Gudgeong grease, he

thinks with regret that he will have to go home with his hands like a coal heaver's, and that he will have to spend half an hour in making his dukes and digits presentable again. There is a way by which all this trouble may be avoided, and the time necessary for washing will be reduced to a very few minutes. The writer has employed this method very many times, and it is always reliable.

To save time in washing, just get out before you get to work in the grease, the soap cake, powder, jelly, or whatever form of soap you use, moisten the hands—do not wet them—and rub soap all over them. Rub the pores full. See that every portion of the skin is filled with soap in a moist form which will penetrate the wrinkles and rough places and which will affectually coat over the entrance to every pore. If too much water is used, the hands will be very slippery. With just enough water, they will be a little sticky for a few minutes, but that condition soon disappears and tools can be readily held and used.

Then, after the work is done, no matter how black and greasy the hands may be, just go to the nearest brook or puddle, or tap the jacket water for a few ounces of liquid and the manner in which the grease rolls off of the hands is as gratifying as it is quick. The pores being all covered or filled with soap, the steel dust could not get into them, and, being all on the surface, and outside of the soap coating, the first touch to water loosens the dirt and off it comes with the soap. This is a mighty good trick and the autoist can avail himself of it with advantage in many instances.

Some people who have delicate skins may have trouble if the soap is left too long in contact with the hands, but the majority of men will have no trouble, particularly if the hands be rubbed with a little vaseline or benzoin solution after the soap has been washed off.

PALMETTO SOAP.

There is one variety of soap which, as far as the writer is aware, is made only in the city of Jacksonville, Florida. It is known as "Palmetto" soap, and is alleged to be made from the juices and other substances obtained from the saw or scrub palmetto. The Palmetto soap will not roughen the most delicate skin. I know this to be true, for I've tried it on mine! This soap can be rubbed to a lather upon hands or face, and in a few moments, the rubbing being continued, every vestige of the lather—and the soap, too—disappears, leaving the hands smooth and apparently clean. At any time within 24 hours, upon the application of water to the skin, and light rubbing, the lather will reappear, and the hands may be washed in the usual manner.

I have applied a coating of this soap to hands and face in the morning, passed the entire day directing the workmen employed in erecting a factory, and before leaving for home at night, it only required the application of water to secure a fine wash. Some other soaps may do this, but they may injure the skin, which this Palmetto soap will not do.

To Clean the Wind Shield.

An excellent method of keeping the glass of a wind shield clear on a rainy day, is to rub the outside of the glass with a rag dipped in glycerine or kerosene. The glass will at first appear dull, but as soon as it is rained upon it will become as clear as though it had been dried.

LOCATING TROUBLE.

He Did It After Deep Reflection and Communion With His Pipe.

A reader gives the following interesting experience in locating an internal trouble:

"I can give you an instance which occurred to me last Sunday, and of which I am rather proud. I had been running hard and well, and had, as I knew, quite exhausted my cylinder oil. All the same I was taking a steep grade in fine style when I shifted my spark accidentally and the car stopped. I cranked her up again and found to my alarm that there was not the least compression—not enough to make an explosion, though spark and mixture were rich. Obviously there was a leak somewhere; I could hear it but not locate it. Following my habit, I cursorily satisfied myself that the externals were right, then lit a pipe and thought. The result was not reassuring. I had been running for ten miles at high speed and on steep grades with no oil in my cylinder, and it was a hot day. Finally to carry me up a very steep hill, I had borrowed half a cupful of lard oil from a station master—an oil used in signal lamps. The result of my reflection was that the use of this burning oil in an engine already dry and hot, would consume every bit of grease or soot in the crevices and then help to burn out the metal, either of the cylinder coat or piston rings, or of the valves. My decision was to let the engine get thoroughly cold and fill it up with cylinder oil, simply to get a start—knowing that if you can once start an engine it has a mysterious capacity for curing itself.

"My deductions were not right (I knew nothing about metals and oils), but my decision was—the decision, I mean, to start the car even without compression. I filled it up with cylinder oil (walking some miles to get some), and generously tickled the explosion chambers with gas before cranking. There was no compression, as before; but gradually, as the thick oil worked in, there was enough to make the faintest bit of explosion. I persevered and at last got a start. I mounted the car and she took the steep hill like a horse, and never faltered again.

"The only thing that could have been the matter was that the exhaust valve, hot and dry, had stuck at the open when she stopped. The leak I heard was simply through the muffler. The first explosion shook her free and the rest was easy."

"This does not seem to show much repairing talent," the speaker continued with a laugh, "but I am proud of it all the same. Three professional chauffeurs of large cars stopped to advise me when I was stuck, and none of them came as near to the right guess as I had. Each of them, of course, began by meddling with the plug or timer. One left me with the comforting assurance that my cylinder was cracked. Another knew that either the piston joint was burnt through or all the rings broken. A third said the spring of my intake valve was too weak. One and all declared that there was nothing to do but take off the cylinder head and carry its 'innards' to a repair shop. I alone relied on my observation that everything was sound and that there was some accident of overheating which would rectify itself with oil. And you see I was right."

The solid tire can be renewed for \$7.50 and the friction transmission, complete, for \$12, as against \$40 for a pneumatic tire and \$75 to \$300 for geared transmission.

Car Truck for a Garage.

From J. L. H. Mosier, New York.—There is one thing that the automobile industry has made manifest and that is, the lightest car cannot be handled and manoeuvred half as easily or readily by hand in the garage as can the heaviest horse vehicle in the salesroom or carriage house. The fact that the construction prevents the cramping or turning beyond a circumscribed space because of the chassis necessitates the use of a handy truck, especially when the garage is of limited space. To overcome this difficulty the writer has invented what he considers a handy garage truck, as follows:

Fig. 1 shows the truck less the wheels. A is the hard wood plank, two or more inches thick, accord-

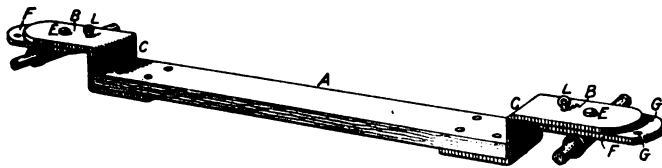


Fig. 1.

ing to the weight of the car, and 12 or more inches wide, according to the size of the wheels, so as to permit of blocking the same when on the plank to prevent rolling off the plank during manipulation. The plank must be long enough to give clearance for the wheels between the vertical parts C and C of the end plates. The outer and upper ends of the plates B B, turn upon the axle plates F F, which are secured to the axles, G G are holes in front of the outer ends of the axle plates F F, for the insertion of the tongue

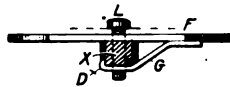


Fig. 2.

or guiding or drawing rod shown in Fig. 3. A locking pin, L, may be inserted into holes passing through plates B and F, whereby the axle (either one) is to be held rigid. Make the plates of half inch boiler plate, full width of plank, and secure them with one-half inch bolts as shown. E E are king bolts. Fig. 2 shows a side view of the axle plate, in which X is the axle, and L the king bolt. Make the axle bolt of the same thickness as the plank plates and the same width. Make them large enough to serve as a fifth wheel and



Fig. 3.

make the outer end long enough for making the holes B B, far enough ahead so that when the draft hook is inserted it will clear the upper plate B B, as shown in Fig. 1. Fig. 4 shows the axle having a swell to make the same strong enough for making the hole to receive the king bolts. In securing the axle use stays as shown at G, Fig. 2, which is furnished with the hook D, which relieves the bolt of strain. The axle ought not to be less than $1\frac{1}{2}$ inches square, with spindles as large as the iron will turn. Use cast iron wheels, those without spokes, and about two inch tread to prevent cutting in the board floor or wrecking concrete or cement floor. Place a thin washer outside of the wheel and secure with $\frac{3}{8}$ inch cotter pins. Place a thin washer on the king bolt between

the bottom and top plate—just thin enough to allow play between the bottom and top plates which will prevent friction. The holes, G G, of the axle plate, ought to be placed as wide apart as possible so as to make turning easy. The hooks must fit loosely in these holes so as to permit of quick changing. The tongue shown in Fig. 3 should be of $\frac{7}{8}$ inch iron and



Fig. 4.

about 4 feet long, with the forks and hooks not less than $\frac{3}{4}$ inch in diameter.

Make the draft ring, R, 10 inches by 4 inches. The draft pins should have the eye 1 inch over all, with half inch hole for securing the chain. Make the shank long enough to go through both plates and project about $1\frac{1}{2}$ inches to prevent working out. Secure it to the top plate with a chain.

When ready for use the car may be run upon the truck and may be turned in any desired direction, care being taken to block the wheels when on the truck. The possibility of being able to turn the truck to suit convenience is an important feature.

THE PAINT SHOP.

Motor Car Varnish Difficulties—Divers Develtries Directly Dealt With.

BY M. C. HILLOCK.

Varnish devilties are due to disturb the painter at this and later seasons and it may happen that to be forewarned is to be forearmed. The automobile painter cannot reasonably claim exemption from the ills which doth so easily beset his brother of the carriage paint shop since the same class of varnish is used upon both the horse-drawn and the horseless carriage, and the surfacing conditions upon both are quite alike.

"Graining out" a so-called varnish deviltie is not usually met with in the repainting business except in case a job of this sort comes in for building up and elimination of the "grained out" appearance.

The trouble is due chiefly to priming too closely upon completion of the wood working processes, or to the exposure of the dry wood, after the wood surfacing processes, to dampness. Graining out may also be due, and indeed often is due, to a priming coat inadequately dry being smothered under additional coatings of material. Excessively porous roughstuff, not overly strong in its binding properties, is likewise a promoter of graining out. Moisture confined under a foundation of material produces graining by sucking the paint and varnish material in and pushing the grain of the wood out.

When a job of this sort comes to the shop the painter had best cut the surface down close with No. 1 $\frac{1}{2}$ sandpaper, and then apply a coat of lead carrying one part raw linseed oil to three parts turpentine. Permit this coat to dry 36 hours, at least. Then take common hard drying carriage putty, thin with turpentine to a glazing consistency, and with a broad $2\frac{1}{2}$ inch half elastic glazing knife, draw putty all the parts upon which the "grained out" condition exists. Set aside for another 36 hours. Then putty any existing deep cavities. The day following apply a coat of roughstuff, following with three additional coats in as many days. Set aside after the application of the last coat of stuff for a couple of days for the foundation to cure

out, and then rub with artificial pumice stone or rubbing brick. Now color and finish in the usual way.

In case the surface is cracked along with the graining out, it were a good policy to burn the old paint from the wood and start with an entirely new foundation.

The cracking of varnish is another difficulty commonly met with. With the fissures which come with age, and are a natural sequence of all varnishes once they have reached a certain time limit of service, we are not mainly interested in this article. The premature cracking and splintering of varnish before what we recognize as its allotted time is the matter here at issue.

The hurrying of coats of paint and varnish, one upon another, thus interjecting one or more imperfectly dried coats is almost certain to develop cracking. Inadequately dried rubbing coats of varnish, and sometimes even a lack of uniformity in the selection of the varnishes used produce surface fissures.

Between this class of surface cracks and those produced by strains and wrenching of the surface there is a wide difference, as a close examination will disclose. On the automobile body doors, and wherever the surface is subjected to violent or unusual strains, the long, circular, sweeping fissures, commonly known as force cracks, will appear. The fissures developed through imperfectly dried coatings of material show lines running at right angles with each other, cutting the surface up into irregular squares, or into straight, rigid lines. The cure for premature surface fissuring consists in insuring the sure and perfect drying of each and every coat of material entering into the paint and varnish structure.

The Storage Battery.

If your storage battery should fail to give regular spark before being discharged, examine wires leading to the battery, connection, etc. You may have poor contact. Always keep wires clean.

A discharged storage battery will freeze in a very low temperature if exposed ten or fifteen hours.

Do not overcharge a storage battery, either by charging too fast or too long. Always follow instructions in charging table.

Volts simply mean pressure. Ampere hours mean capacity.

If a storage battery fails to give estimated mileage, have coils tested. Coils should not draw to exceed one ampere.

In filling battery jars with electrolyte, be careful not to overflow, as the acid is liable to damage anything with which it might come in contact, except glass, earthen, or hard rubber.

While charging storage batteries never go near cells with a naked flame.

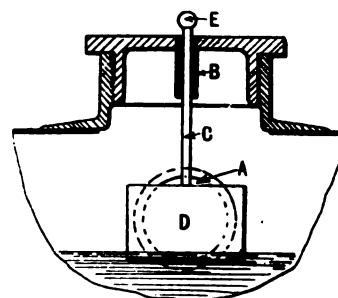
Axle Alignment.

If your car has had rough use on hard roads it may have affected the axle alignment. In making a test for the back axles take the length from the centre of each road wheel to some point of equal distance along the frame. If the car be a chain-driven one, any errors can be corrected by adjusting the radius rods. If the car be of the live axle variety the errors can be adjusted, the method varying with the construction of the radius rod parts. In testing in this manner it is advisable to use something inextensible, such as a straight strip of wire or wood, so that there can be no question of stretching, and the measurement must be taken from the axle

centre to as far forward along the frame as possible to prevent any error due to one spring being stiffer than the other. Next the parallelism of the axles should be tested by laying the wire or wood longitudinally against the wheels at each side, having first ascertained that the wheels are perfectly straight. This can be effected by wheeling the car along and seeing that the front and back wheels track accurately over a suitable distance.

Liquid Level Indicators.

Few tanks are fitted with means for indicating the level of their contents without examination, although there are a number of simple devices which may be fitted to any and every tank. We give herewith a method applicable chiefly to radiators where thermo-syphon cooling is used, but it is equally applicable to gasoline tanks by suitable modification. It will be understood that with thermo-syphon cooling it is essential that the water level should not fall below the top water inlet pipe indicated by the circle A in the drawing. If the water fall below this level, circulation ceases, but if a pump were used circulation would continue. With a leaky radiator there is considerable risk of the level getting too low and serious trouble



A Level Indicator for Radiators.

ensuing. Fit a small tube B to the radiator cap. This tube can either be screwed or sweated on the cap, and acts as a guide for a wire stem C carrying a cork float D, which rests on the top of the water, the stem C indicating the level. The float is only intended to indicate a difference in the level of a few inches. To prevent the stem C projecting high above the radiator cap when the radiator is full, the tube B can be extended downwards, so that the knob on the end of the stem only projects, say, an inch above the cap, the float then being submerged. The stem remains this height above the cap until the level falls to near the top pipe A. The float is now free to fall with decrease of water, so that when the knob E rests on the radiator cap it will be known that the water level is getting dangerously low, provided the length of the stem weight of the float, etc., has been adjusted to the particular construction of radiator.

The advantages of this arrangement are that the stem C and knob E are hardly visible to anyone but the occupants of the car, whilst the arrangement can be fitted to existing radiators for a few pence.

The same arrangement can be adapted to gasoline tanks without having to cut them open or fit any relatively expensive indicator.

The Tire Valve.

Never allow a tire valve to remain uncovered; if the cap be lost, cover it with a piece of leather or rag and a rubber band or string round the stem. If dirt is allowed to enter a leaky valve is bound to result.

TROUBLE DEPARTMENT.

Questions answered by the Y. M. C. A. Automobile School, 322 West 57th St., New York.

This department is intended to be a "trouble clearing house," and it will be esteemed a favor if our readers will add information to it from their own experience or knowledge.

Knocking and the Exhaust.

Question.—I have been troubled by a knocking in my engine when on heavy grades or whenever the engine is pulling hard at a slow speed. The valves have been ground and timed, the carbureter (Kingston) adjusted, and all bearings seem to be in good shape. There is an uneven exhaust when the engine is running idle. I have trouble in keeping the carbureter in adjustment and use batteries very extravagantly. What is most likely to be the source of my trouble? My car is a Ford runabout and has been in use but a short time.

Answer.—The fact that you have had trouble with the adjustment of the carbureter would indicate that the knocking is caused by carbon in the cylinders. A very rich mixture from the carbureter, or feeding too much oil will cause a deposit of carbon in the combustion chamber of the cylinder. This carbon will become incandescent after several explosions have taken place, and will stay incandescent long enough to ignite the next charge of gas that is taken in, before the crank has reached and passed center. This will tend to force the crank shaft backward, and while the momentum that is stored in the flywheel will keep the engine running in the proper direction, the result of this back pressure will be a very perceptible knock.

Knocking from this cause would occur only when the engine was going at a low rate of speed or when a full cylinder of gas was being taken in. The only satisfactory remedy is to take off the cylinders and scrape out the carbon. The uneven exhaust may be due to the carbureter being out of adjustment, to ignition trouble, or to the inlet and exhaust valves being out of adjustment. The tappet rods that push the valves open should be adjusted so that there is a clearance of about $1/64$ of an inch between them and the valves and they should all be uniform. If there is much more clearance than this or if it varies on the different valves the tappets should be replaced.

Graphite as a Lubricant.

Question.—Will you kindly give me your opinion of graphite as a lubricating agent for air-cooled gasoline engines?

Answer.—Graphite as a cylinder lubricant for either air-cooled or water-cooled engines is good if used in very moderate quantities. If a considerable amount is used it will cause carbon deposits in the cylinders that will make it necessary to take the cylinders off to clean it out. It cannot be used to the exclusion of oil but good results can be obtained in assisting lubrication by oil if the cylinders and pistons have a coat of graphite rubbed well into them.

Steering Gear Trouble.

Question.—I have a 1909 Buick runabout and am having trouble with the steering gear which binds. After flushing all bearings with gasoline and kerosene and then putting new oil in, the trouble continued. Had the steering gear taken all apart, column tested and found straight and all re-assembled by a good mechanic but the trouble continues. There is also considerable lost motion in the steering wheel. If this is not corrected

will the consequence be bad? Any suggestions will be welcome.

Answer.—If the bearings on the drag bars and the swivels on which the front wheels are placed have been examined, we would suggest that you examine the front wheels and see that they have proper foregather and undergather. The distance between the front of the wheels should be about one-half inch less than the distance between the rear of the wheels. This will give them somewhat the effect of the bow of a boat and will make steering easy. The distance between the two wheels measured from points near to the ground should be about one inch less than when measured between points near the top of the wheel. This give the axle greater strength, while if the distance between the two wheels is greater close to the ground an undue strain would be placed on the swivel which would tend to break it off and would also cause such a binding that steering would be made difficult.

Lost motion and binding in the steering gear are not dangerous if the driver is competent, but both will cause excessive wear of the parts.

Wheels and Tires.

From Henry Syrek, Ohio.—Being a subscriber to your valuable paper, I read a great deal about advantage and disadvantages of small wheels equipped with pneumatic tires and large wheels equipped with solid tires.

Now of course everything in its place, but it has occurred to me that for country driving in all kinds of weather, and all kinds of roads, a high wheel is the better, though I am speaking from theory and have no practical knowledge of this matter. There is one thing that appeals to me and that is that a large diameter wheel will not jar or shock by far as much at a given speed as a small wheel, especially on rough roads. We will take for instance two wheels running at the same speed, one being 28 inch and the other 56 inch. Now it would seem to me that the 28 inch wheel would jar four times as hard as the 56 inch, on account of the jar increasing with the square of the diameter of the wheel. A person who would fall from a machine at 20 miles an hour speed would get considerable more than double the shock than one that fell from a machine going at 10 miles an hour. Likewise a 28 inch wheel would jar more than the jar of the 56 inch wheel, so a 44 inch wheel would not jar half as much as a 30 inch wheel at a given speed, other things being equal. What I desire to be informed of is if under ordinary country road conditions a 44 inch wheel, solid tires would jar more than say a 30 inch pneumatic tire. Pneumatic tires to run right and wear must be inflated very hard, so I don't see much difference. There is one thing in favor of the large wheels and that is a car with large wheels would seem to draw easier than with small ones on rough roads, and they seemingly would have more traveling power. Of course it is said that a large wheel must be stronger than a small one. True, but it would seem that they would not weigh so much more than a smaller wheel, and the jars on them are naturally not so hard. It is said that they run harder than the small ones on account of their added weight, but on the other hand they need not turn so fast as the small wheel.

Now this is my theory about this, and I would like to learn if it is true in practice.

Reply.—Speaking in a general way our subscriber is right. It may be remarked, however, that under similar road conditions, a solid tired car with 44 inch

wheels would jar far more than one with 30 inch pneumatic tires. The matter of wheels is both interesting and instructive, even though much must be conceded to manufacturers who have been studying it for some time.

A Few Engine Facts.

From George Kiltz, Illinois.—I wish to say something about a good running engine. There are some very important facts about it that all should know. In the setting of the valves on a 4 cycle engine the exhaust valve must begin to open within $\frac{1}{4}$ inch of its power stroke, and remain open for $\frac{1}{4}$ of an inch on its suction stroke. The intake valve must open immediately after the exhaust valve and must remain open $\frac{3}{8}$ of an inch on the compression stroke. This gives the needed time for the mixture of air and gas to fill out the vacuum.

I believe valve cams should be made so as to keep them wide open as long as possible, and to close quickly. The theory that a cam should be made so as to let the valve down easy is a poor one. For in an engine running from 500 to 800 revolutions a minute, there is no easy letting down of the valve. On the other hand, in the gradual closing, there is considerable time that the valve is barely open. Owing to this the burnt gases cannot escape very fast, and this means back pressure. The same condition exists in the intake.

There has been much trouble experienced owing to carbon in the cylinders, and especially at the piston head. Under such conditions the engine will run very nicely when cold, but when it gets very hot and you are about to climb a rather steep hill or negotiate a long stretch of sand, the engine begins to pound, and does not want to pull. More than once this has happened with me. I have had my engine work very hard going up grades, and after scraping the engine out so that it was clean I could run up the same grade with ease, and there would be no pounding whatever, although the engine was just as hot as before. I have tried coal oil to cut the carbon, but with no satisfaction. The only thing I found was to scrape the carbon out with a knife or sharp tool of some kind. I don't know of any one thing that would prove of greater benefit to an engine than to have a device made so as to scrape the head of the piston, also all the parts where there are carbon deposits. If this could be done, say once a week, it would probably answer.

The piston head should be turned smooth as well as the whole compression chamber. Then the carbon could be scraped off very easily.

My attention has been drawn to the 2 cycle Atlas car. If it is as good as the Atlas people claim, it would be my ideal of an auto engine. It seems to be simple, and there is no valve difficulty, while it does the same work that is done by twice the number of cylinders. In a 4 cycle engine there are from four to eight revolutions per minute. There is an awful pounding of valves. Just set your engine running, and then watch the valves and springs. I wonder that they last as long as they do.

I should like very much to hear from anyone who has an Atlas car. I would like to know how it suits them, and all about it.

Two and Four-Cycle Engines.

From J. S. Wright & Co., Pennsylvania.—Do you consider the two cycle engine to be as good as the four cycle engine, and what is the difference between them?

(Note by the Editor.—The question is one that cannot be answered by yes or no, or in a few words. Possibly it may be of some information to reply that in some respects the two cycle engine is better than the four

cycle and in others not so good. Information concerning the comparative merits of the two styles of engine will be found on another page in this issue. If we are not mistaken, however, the fact is omitted that it is generally conceded that the four cycle engine gives rather more power from the same amount of gasoline.)

Lubrication Leakage.

From the Duffy Grease Company, New York.—Your March issue has a question on lubrication, the answer to which does not cover the matter as we see it, hence our reason for writing. Grease on the brakes comes from no other source than leakage from the differential gear; and this leakage from all gearings is one of the troubles met with by all operators of automobiles. Leakage means waste, besides a dirty car, and floors and many other points too numerous to mention here, and it follows that all waste must be made good with new material.

No one will dispute the fact, that there is no better lubricant for a gearing than a high grade cylinder oil; but the trouble is, that it will not stay where lubrication is needed. It will work out through the bearings, and when it gets too low, so that there is not proper lubrication, then you get hot bearings and gears; and more to the point raised in the inquiry as to the differential gears. Sufficient oil for lubrication means oil all over the breaks, no control of the machine, insufficient oil means filling of the case too often, or should it be neglected, hot bearings and gears, one as bad or worse than the other.

The correct answer to the inquiry, should be, the use of an oil in solidified form, which will give proper lubrication and still remain of a consistency that will not flush through the bearings.

Curing a Knock.

From Avery, Indiana.—I see one of my fellow readers has a mysterious knock, presumably in his motor. Last season I had trouble of this kind. Noise sounded as if in one cylinder. I examined all internal bearings of the motor and found no looseness anywhere. I then examined the timing of the valves and of the spark, but could find nothing wrong. The knock kept growing worse, and increased at once when the spark was advanced to speed up to make a grade, and while climbing the hill the knocking became fierce enough to jar the entire car, which was too much for me, and I resolved to find that knock if I had to take the machine apart from one end to the other, so I went after it and I found it. A loose key in the crank shaft where a coupling joined it to the transmission shaft. A new key tightly fitted cured the knock and made the motor run quietly as ever.

Glycerine and Water.

From William Kuhlmann, Texas.—In some of your late issues I notice a discussion as to the properties of glycerine and water. Now chemistry tells us that glycerine will dissolve in water in all proportions, and that such solutions are permanent till actual congealment takes place. Glycerine has a strong affinity for water and will attract moisture from the air if exposed; it is what the chemist calls "hygroscopic." Chemically considered, there is a difference between a mere mixture and a solution. Milk, for instance, is a mixture of butter globules and water, and separation takes place when at rest. Glycerine and water, however, form a complete solution, and as stated above, will unite in all proportions and form a permanent solution.

An Anti-Kick Device.

Question.—Would it be practicable to have an anti-kick-back device on automobile or stationary gas engines?

What, in your opinion would be the objections, if any?

Would such device be injurious to the motor, something that would prevent engine turning backward?

Answer.—In using a device that would keep the engine from turning backward there would be some danger of twisting the crank shaft, breaking the connecting rod or lifting the cylinder off. If the device were placed on the flywheel, which would seem to be the most convenient place, there would be danger of loosening the flywheel from the crank shaft. Any device that would need setting just before the engine is cranked would not be practical, as a man who would forget to retard the spark would be very likely to forget to set the anti-kick-back device.

We do not know just what apparatus you have in mind, but anything that would give a sudden and decided check to the rotation of the engine in either direction would be likely to work injury to it.

The Ideal Car.

From Avery, Indiana.—I notice in a recent issue that Mr. Alger notes some improvements which might be combined to advantage; but I will go him several better in this matter. My ideal car would be friction drive (which I am using and know to be all right) not only a 2 cycle engine but such engine would be air cooled, for it can't be denied that air cooling is successful in some of our best cars and I have seen a 2 cycle vertical air cooled motor which for compactness and simplicity can't well be beat. I would have solid tires of cushion form made by an Ohio firm, and would have all springs full elliptic compound with inner leaves to do away with the need for shock absorbers. The car I am now using has not only the friction drive, but also the cushion tires which I find superior to pneumatics; no tire troubles here. A car with all these features in perfected form is open to one objection, viz., it could not be made fast enough to supply the demand, when the public learned its merits.

To Find a Slow Leak.

From H. J. Schrader, New York.—I have seen many inner tubes thrown away simply because the owners could not find slow leaks when put in water. Now I rub soap suds all over my tubes and valves with the valve cap on, and let them stand a few minutes. If there is then a leak you will be sure to see it by the bubbles.

Car Efficiency.

From H. M. Davis, Maine.—There seems to be plenty of room for argument between Vermont and Wisconsin as to the efficiency of their steam cars. Mr. Glover's car out in Wisconsin, balks at the hills because his fire and steam go down, which sounds reasonable. There is Mr. Delrymple and Mr. Gray, of the Green Mountain State, whose cars climb hills faster than the British ran when pursued by Ethan Allen and his hosts. Why don't the Stanley Motor Carriage Company secure those two machines and make all the rest like them? Then the finish of all other cars would commence from that date. Verily the Stanley Motor Carriage Company must favor Vermont. Possibly my ex-runabout is the only one of the kind that will burn out a superheater in two

months with fair usage. How many of those 24 cars he mentions will carry four people over country roads, 12 miles on one gallon of gasoline and 300 on one gallon of oil? The best I can do is 8 and 100 respectively. What we want are reasonable facts so that a purchaser can have a show for his money.

The Speed Mania.

From H. B. Van Decar, Nebraska.—You are putting out a good journal and your position relative to the retailer is O. K., as is also your position on the "speed mania." Twenty or twenty-five miles on country roads is fast enough for anyone to drive, regardless of whether the car has a speed limit of thirty or seventy-five miles an hour.

Automobile engineers, it is claimed, have found that the greatest attainment of horsepower in the conversion of gasoline into work is when a temperature of 350 degrees is reached in the cylinders. Some have held that the hotter the engine was the more efficient it was up to the flashing point of the lubrication. Ordinary lubrication flashes at 450 degrees and better lubrication at 480 degrees.

High wheels allow an axle clearance of from twenty to twenty-four inches, which is as much as that of the ordinary horse-drawn vehicle; hence the justification of the claim that "high wheels travel all roads because all roads are made to be traveled by high wheels."

The avoidance of too rich or imperfectly gasified fuel mixtures and the employment of a not excessive quantity of a grade of lubricating oil are preventives of carbon in piston heads and the surfaces of the combustion spaces of gasoline motors.

In replacing the gland of a water circulating pump use plenty of graphite with the packing. The spindle is seldom sufficiently lubricated, and the graphite will go a long way toward remedying this.

A handy thing for the motorist to keep in his tool box is an assortment of wire nails of various sizes. These nails may often be used to replace split pins and the like.

In replacing sparking plugs in hot cylinders they should not be screwed up too tightly or difficulty will be experienced later in any attempt to remove them.

It is estimated that the value of automobile products of Detroit for the year 1909 will be \$50,000,000, making it the automobile manufacturing center of the world.

Keep the machine free from dirt and well lubricated, use some discretion in driving over rough roads and the up-keep cost will be very little.

As a varnish for terminals it is recommended to use sealing wax dissolved in gasoline with a little linseed oil added to prevent brittleness.

If a fan belt is constantly failing, either from the belt flying off or breaking, suspect the alignment of the pulleys.

If an acetylene headlight throws its flame too high, the trouble, in all probability, is due to clogged burner openings.

May Spring a Leak.

A leak in one of the lubrication pipes may occur in mysterious ways. Perhaps a sharp blow from a stone thrown up by the wheels, or a loose tie has allowed the pipe to jar and fracture. This sometimes happens at the back of the dashboard by reason of the gauge being fixed to the latter while the other end of the lead is fixed to the engine case.

The discovery of a fault of this sort, if not self-revealing through leakage on the outside, is a tedious and difficult affair, and if not very pronounced, may be temporarily cured by using a thicker oil. But it ought to be attended to at once, since it may develop into a serious failure and hang the driver up in a most inaccessible spot.

Rattling Bonnets.

Of all noises that are hard to trace on a car, those set up by a bonnet which shivers on its beading and chafes at its fasteners are perhaps the most elusive. Once run to earth, they permit of a very simple remedy. It is only necessary to drill a few holes in the metal beading which follows the run of the bonnet around the back of the radiator and the front of the dashboard, and acts as a bed for the folding metal sheet. If a stout leather lace be then threaded in and out of these holes all the way round, and secured by a knot tied in each end, it will both tighten the spring fasteners a trifle and also effectually deaden any clatter in the sheet steel edges of the bonnet itself.

For Worn Piston Rings.

If piston rings wear down so that compression is deficient they may be made as good as new temporarily by simply placing under the thin portion of the ring a straight piece of clock-spring two inches long and the width of the ring. This will act as an expander, and will make the ring hug the cylinder walls.

Resin on the Leather of the Clutch.

Do not put resin on the leather of a cone clutch; the cure by such agents as resin is only temporary and very detrimental to the leather, and resin may become heated by the friction, and consequently stick to the clutch, so that sometimes it cannot be withdrawn when required.

Keep the Feet Firm.

Drivers should sit in such a position in rough roads that the feet will not be shaken off the pedals. Otherwise, when the clutch is disengaged, as it should always be for rough roads, and the car allowed to "coast," the feet may be jarred off the pedals, allowing the clutch to slam in, and causing great strain on the gears and transmission mechanism.

Quiet Cars.

Everywhere can be observed the tendency toward reduction of noise. Just a year ago engine flexibility and the perfection of the lubrication system were the aims of the designer, so now noiselessness is the feature on which greatest stress is laid.

Shut Off the Gasoline.

When leaving the car at night, or for any length of time, make it a practice to shut off the gasoline supply. If this is not done, and if there is a leak or a flooded carburetter, a fire may be caused by some one carelessly tossing a burning match under the car.

AIR-COOLED ENGINES.**Head of the Franklin Car Factory Makes an Interesting Statement.**

From H. H. Franklin.—Air-cooling of automobile engines has a primary advantage over water-cooling in that it is direct. As a matter of fact the cooling of all internal combustion engines must be done by air; there is a question only of whether the air shall directly cool the motor or shall cool a quantity of water that cools the motor.

With air-cooling it is impossible to have a large number of complications and troubles that are the inevitable accompaniment of water-cooling. To justify water-cooling one must show benefit from the introduction of an intermediary between the air and the engine with that intermediary's string of complications, must show advantage in taking a roundabout way instead of the shortest and simplest way.

If the maker of an automobile adopts the system of water-cooling he must weigh down his engine with water jackets, radiator, pump and pipes. If he adopts air-cooling all these are eliminated. This reduces the automobile's weight and simplifies its entire construction.

Not only does the equipment for water-cooling weigh down a motor, but as long as the machine lasts the cooling system has a high trouble potentiality. It is a constant source of worry. Shaken by the jolts of travel over the roads, joints work loose, and the water leaks away; or the engine boils dry even without the excuse of a leak; and the cooling system then breaks down.

Water-cooling is absolutely dependent upon keeping the water in circulation and below the boiling point. As a matter of fact, the greatest engine efficiency is obtainable when the temperature of the cylinder walls is above the boiling point, about 350 degrees, but this is impossible for a water-cooled motor.

In winter the troubles of water-cooling multiply. The water then, in addition to leaking and boiling dry, presents a new danger in the certainty of freezing when the mercury gets down to the points which it commonly reaches throughout the winter in many parts of the country. Anti-freezing solutions, by their very number, which is legion, show that not one has been found which can be satisfactorily substituted for the water. The conclusion is forced that the only way to cope with freezing troubles is found in air-cooling.

When the water-cooled engine freezes it leaves a wreck. It produces not a temporary annoyance, but a breakdown. It means repairs and expense. Freezing is so serious a menace that many automobilists find it easiest to forego the use of their water-cooled motor cars during the cold weather, drain off the water and stow them away and wait until spring to get any farther use out of them.

Meanwhile the air-cooled automobile is at work; it is in shape to serve its owner every day of the year in any climate and in any condition of weather; for it has no water to freeze, no pipes, water jackets or radiator to burst, and it has nothing to leak or boil dry.

The efficiency of air-cooling has been increased with the continued refinement of the engine during the short history of the automobile until now air-cooled engines are made that with the use of a simple auxiliary exhaust at the base of the cylinder get rid, immediately upon the completion of the power stroke, of seventy-one per cent. of the burned gases, leaving only twenty-nine per cent. to pass up through the cyl-

inder and out through the regular exhaust; this system secures the discharge, immediately after its work is done, of most of the material which formerly remained for a period to heat the cylinder walls. This arrangement, as it stands to-day, is an accompaniment of only air-cooled engines.

The main exhaust which is used in this connection is concentric with the intake valve, the two being at the apex of the cylinder. Being concentric, they are made larger than they could be made if placed separately, and this helps in emptying the chamber and minimizing the work to be done by the air in contact with the cylinder exterior. With this kind of an arrangement a dome head is possible for the interior of the cylinder, which, leaving no nooks to retain the burned gases, similarly helps in clearing the chamber. Moreover by producing a minimum of interior surface without reducing the exterior, or heat radiating, surface it also helps in reducing the volume of heat which passes through the cylinder walls and is taken up by the air outside.

The disposal of the heat that goes through the cylinder walls is accomplished effectively by the use of sheet metal, heat-radiating flanges shrunk onto the cylinders. These multiply the extent of the heat radiating exterior, about which a current of air is driven by a fan at the front end of the hood. The number of flanges per cylinder is increased as the distance of the cylinder from the air fan increases, with the exception of the last cylinder, which, getting additional air from a suction flywheel at its end of the hood, has need of less than its immediate neighbors.

The simplicity of these details makes possible only a minimum of breakage or trouble; but if breakage or trouble comes in connection with one cylinder it does not disable the engine; it does not leave the automobile stranded, far perhaps from a repair shop or a desirable stopping place; the trip can be finished with the other cylinders.

But if there is a break in the cooling system of a water-cooled motor car the car is out of service, and a wait must follow until help has been secured from the nearest repair shop and repairs made.

PECULIAR SWINDLE.

Collects Tires for Repair But Does Not Return Them to Their Owners.

A man who represents himself as a member of a tire repair firm of Jamaica, Long Island, N. Y., takes away valuable tires to be repaired and then fails to return them. There have been at least a dozen complaints made, and it is expected by the Jamaica firm that forty or fifty more complaints will come in before the swindler is apprehended. The man's specialty seems to be physicians. Several doctors in the vicinity have fallen victims to him, and are now wondering when they will get their tires back. Henry Fuller was one of the first to complain to the police. According to Mr. Fuller, a man came to his place about February 15 and declared himself to be a member of the Jamaica Tire Repair Company. He handed Mr. Fuller a card bearing the name of the company, and pointed to the name of C. C. Smith on the card as his own. The man was an excellent talker, and apparently knew all about automobiles. He said that after "his firm" had repaired the tires they would be good for more than 1,500 miles of travel. Mr. Fuller gave him several tires, waited a week for their return, and then waited two weeks more, before he communicated with the police. Before he went to the

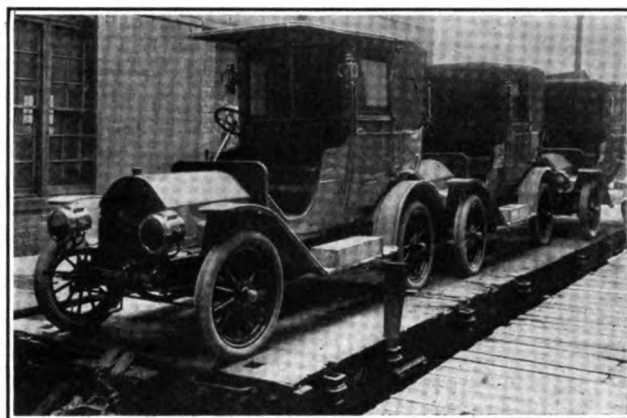
police, however, he called on the telephone the Jamaica Tire Repair Company and asked about his tires. He was informed that the company had no tires to be repaired in his name, and was told that several others had also asked about tires which the company was supposed to have solicited.

It is learned that there are possibly fifteen or twenty victims.

Cartercar Taxicabs.

Still another automobile concern has entered the taxicab field and are now building and shipping these popular new cars. In the illustration shown herewith is a view of the first shipment from the factory at Pontiac, Michigan, of Cartercar taxicabs. It is an interesting fact that these cars are going into the already well developed taxicab section of New York.

It became a matter of necessity for the Catercar Company to build this new model inasmuch as their regular touring cars have been used in many sections of the country for livery purposes, because of the friction drive. A conspicuous illustration of this fact is



Load of Cartercar Taxicabs.

the Cartercar which is being used in conveying tourists from San Jose, up Mt. Hamilton to the Lick Observatory.

Another owner of a Cartercar five-passenger touring car at Sandusky, Ohio, has used his machine for demonstrating and then put it into the sight-seeing business. This owner carried over 4,000 people in three and one-half months, driving his car over 12,000 miles, and as he states, "at practically no expense except for engine oil and gasoline."

The new model taxicab has the same chassis as the Model "K" touring car, and is equipped with the new aluminum chain housing, permitting the chain to run in an oil bath protected from dirt and grit. It is this new feature, in connection with the friction transmission, which has made this car a favorite with those desiring a machine for this kind of service.

Adjusting a Bearing.

After taking up lost motion in a bearing take care in making the final adjustment that the strain of the bolts does not come on the journal, but on the faces of the bearing lines or bushings.

Filling the Radiator.

Pure rain water is the best that can be used in the cooling system, as it is free from the mineral substances which are deposited in the radiator, piping and jackets by hard water.

CARS FOR PHYSICIANS.

Good Points for Intending Purchasers and Others.

Dr. M. C. Thrust, of Philadelphia, gives in the Medical Journal the following comprehensive views of the automobile for physicians, and it will be read with approval by others:

During the past five years the marvelous development of the automobile has resulted in a much more satisfactory and serviceable car. Its use among the medical profession has increased to an enormous extent, chiefly for this reason.

A good serviceable car adapted for the use of a physician can be purchased to-day for almost one-half the price of five years ago.

Type of Car Desired.—Practically all the 1909 models of the reputable makes have four-cylinder engine with shaft drive and magneto ignition, and one can purchase cars of various sizes and horse-power according to the use he desires of it.

For the general practitioner who desires reliable service the runabout or small touring car is the most desirable, with from fourteen to thirty horse-power rating. The touring car type with two-seats is often of great value when you desire to carry more than two people, and the extra seat adds but little to the cost of the car. A four-cylinder shaft drive with long wheel base (at least 90 inches) gives smoother action and more comfort in riding.

Gasoline.—Only the best grade of gasoline should be used, as the cheaper grades carbonize the spark plugs more readily, and, by containing a larger percentage of water, often cause the motor to run irregularly.

Oils.—Lubrication is of the greatest importance and it will be soon learned by the beginner that a few cents saved on oil will result in a few dollars' wear on the machinery and bearings. Only good grades of oil should be used.

Ignition.—The most economical is the magneto, and almost all 1909 models possess this equipment. In cities storage batteries are satisfactory and comparatively inexpensive, but in the country districts where recharging causes considerable delay, the old method of using dry cells is essential, although decidedly more expensive.

Spark Plugs.—It is impossible to state that any particular make of plug is the best, as certain makes appear to give the best results in certain motors. This every one learns by experience, as every car is to a certain extent a law unto itself; but one fact remains: that the best spark plugs are those with the platinum tips, as they do not carbonize, hence do not require frequent cleaning as do those with steel contacts.

Tires.—The most expensive part of the maintenance is tires, and usually the most common cause of delay, as punctures will occur and usually at the most inopportune time. This is a problem of great value to the physician as a delay of this kind may mean a life lost. To obviate this I have tried all the various protectors and devices to prevent punctures, and during the past year I have not had a single puncture. My experience with solid and cushion tires has been unsatisfactory. They are hard on the machinery, jolting the car and breaking axles, which cost more than tires. The leather covered protectors with steel discs to prevent skidding have proved the most satisfactory, and, if properly adjusted, the tire proper has but little wear, so that you obtain more than double the wear you would ordinarily expect, minus punctures

which are annoying, undesirable and expensive. These protectors I can recommend to every physician.

Care of the Car.—As in the case of all other machinery care exercised in keeping everything in A1 condition, the engine and friction parts clean, and allowing nothing to get loose, repairing every little thing as soon as discovered, will result in longer wear with better action and a greatly lessened expense account at the end of each year.

AUTOMOBILE PROGRESS.

How the Car Has Been Cheapened and Greatly Improved.

A new condition has grown up. The automobile, a riddle even to the man who made it a little more than half a decade ago, has been divested of its mystery. It is now simplified and is as readily understood as any other piece of mechanism.

Methods have been improved, material bettered and cheapened and the working parts so simplified that to-day anybody can drive and handle a car.

Those nightmares of upkeep that once affrighted the prospective purchaser have been done away with. Every dealer in automobiles can show his customer carefully worked-out tables of figures which show with mathematical accuracy the cost of maintaining a car. These include the cost of repairs, the expense for gasoline and lubricating oil, for tires and parts.

The outlay is now not 50 per cent. of what it once was, and the figures of these dealers can be relied upon, because they are running their concerns on business lines and stand back of every promise their figures make.

The man who invests anywhere from \$5,000 to \$10,000 in an automobile is well enough fixed to be able to ignore what it costs him to keep the car going.

But the buyer of the \$1,000 car is anxious on the subject, and must estimate closely. Five dollars weekly is an item to him, and the difference in upkeep between say \$15 and \$20 a week may be that which will decide whether or not he can afford to become a motorist.

Buyers of the \$5,000 or \$10,000 car generally have wealth so plentiful that they bother little about driving a sharp bargain. The spending of this much money is no particular event in their lives. They have probably bought other automobiles before, and are so used to dealing in cash in big amounts that there is no great call for caution.

In many cases their wealth cost them nothing in actual effort, and they dispense it with comparative indifference to its value; certainly they are not excited enough to bother much about the annoying details.

But the buyer of the popular-priced car has usually had his own way to make. Every dollar he owns represents good business sense and hard, unremitting work. When he thinks what his money meant to him in effort, he resolves not to dispense it without getting full value.

He is willing to spend, but he has to be shown. The habits of his business training impel him to ask for complete assurance that the car he buys will give results. He knows that a "cheap" car may be dear, no matter what the price, and in spending a small instead of a big sum of money for a machine he must be convinced that he is not making a poor bargain for the future.

His doubts usually take the form of this question:

"How is it possible to build a first-class car so cheaply now? Is the reduction in price gained at the

expense of material, workmanship, durability and beauty of design? Will it look like a cheap car? Will it run like one? What proportion of its time will it spend in the repair shop and what will its keep cost me?"

The automobile has merely progressed in evolution; that is all. It is in the same class now as the telephone, the wireless telegraph, electric lighting, the phonograph, etc. It has gone through the experimental stage, it has been put on a practical business basis, and the public benefits by the reduction in price which is ever possible when mechanical perfection is attained.

The evolution has not only benefited the buyer of the low-priced car. The purchaser of the costly machine profits, too. The makers of these vehicles have learned how to produce their motors, bodies, transmissions, axles, electric arrangements far more cheaply and better than of yore, and the surplus the customer is willing to spend for a car is put in the superior elegance of the appointments and the installing of a hundred and one conveniences and luxuries.

At every factory can be seen a great mass of machinery which had to be invented for the special purpose of automobile building. This has done a lot to produce the popular-priced car, for much that had to be done by hand at the cost of infinite time and pains is now better done by the use of automatic machinery, that insures accuracy, and does the work faster and better.

Half a decade ago the automobile manufacturer was bearing the expense of experiments to produce this kind of machinery. Now it has paid for itself, and he can afford to give the public a share of the money he saves by its use. Right in this one item is the explanation of a decrease of 20 per cent. in the cost of cars.

Take the little item of gear wheels. In the factory the writer saw these delivered in the form of castings, so flawlessly made that they required very little fitting. And most of this fitting even was done by machinery.

The casing was put on a machine. A square hole was bored out. In the old system it would have taken a skilled workman two hours to do the same thing and it would not have been nearly so accurate.

Castings were then so roughly made that they formed little more than the basis of the finished-piece part. Now they are so good that fitting is reduced to minimum.

Great progress has also been made in the material of which the parts are made. Much that enters into the production of an automobile calls for special material, that shall combine strength and lightness.

A host of improvements have been made in this line, and the volume of business has grown to such an extent that the producers of metals are warranted in going into the work on an extensive scale, with a consequent reduction in cost. The price has descended as the quality rose. Aluminum, manganese, bronze, vanadium steel and a host of other materials are available now in greater and better quantities than ever before.

To handle this new material are the hundred and one newly invented pieces of machinery. There are saws that cut through steel billets as though they were so much cheese. Grinding devices grind cylinders and pistons, cleaning off the high spots with an intelligence truly human.

Patterns used to be made outside, now they are produced right on the plant of any automobile manu-

facturing concern of any size, and a big slice of the cost of production is put on the right side of the ledger.

Blacksmith shops for repairing tools and for doing a lot of the work that enters into the making of a machine have been added to the equipment of the plants.

Parts are now pressed out by dies and are virtually correct. Pipes are cast in the round with the right curve, instead of being cast straight and then bent to suit. Here is not only a saving in time, but a gain in strength, for the powerful pressure it took to bend pipes often had the effect of weakening them.

Turret wheel lathes do the entire business of shaping and fitting the fly-wheel.

Metal tool boxes can be pressed out by machinery at a less cost than wooden boxes. Fenders also are the product of machinery, hand work being almost eliminated.

Every part of an automobile is now made interchangeable. This is another of the developments made possible by the substitution of machine work for hand work.

Here in brief form has been told the story of how the automobile has been brought within the reach of the citizen of the middle class, a consummation to be hoped since it will mean the making of new enthusiasts, new fighters for the rights of motorists, for good roads and reasonable consideration before the courts and law-making bodies.

Waste of Gasoline.

Sometimes there is a waste of gasoline from the float chamber, owing to the needle leaping off its seat under the influence of road or engine vibration, and so failing to cut off the fuel, which promptly overflows. Two methods of dealing with this nuisance satisfactorily have been found by an English motorist. On one the flooding only occurred with the car in motion, and was solely caused by road vibration; in another flooding occurred whenever the engine was running fast, irrespective of whether the car was on the move or not.

The first and more makeshift of the two methods was to remove the cap which ordinarily protects the end of the needle, so as to press it firmly into its V bed; the cap was then unscrewed back the merest trifle, so as allow only a sixteenth of an inch upward motion to the needle. This does not entirely obviate jumping, but returns the needle to its seat pretty promptly whenever it hops. Wire was then bound round the bottom threads of the boss to prevent the cap screwing itself down and binding the needle down altogether. Another plan is to drill a hole in the top of the cap and use a set screw and lock-nut to clamp the needle; and yet a third is to fit a light spring soldered to a disc or thimble inside the cap, which resists the jumping of the needle, allowing the gasoline to force the needle up by means of the float.

A Three-Cycle Engine.

A three-cycle type of engine is about to be manufactured by two well-known French designers. The claim for this novel engine is that it completely eliminates the great disadvantage of the two-cycle type, namely, imperfect scavenging of the exhaust gases. It gives also an explosion at every other stroke which should spell great efficacy.

GRADES FOR DRIVERS.

Difficulties in Finding the Qualities Often Required of a Chauffeur.

It is a rare thing to find a man who is competent to handle and take perfect care of a car, who has that combination of civility, discretion and obedience that is demanded from the servants in many cases. The independence that the knowledge of competency gives is liable to assert itself in a way that might seem to border on impertinence, or if the qualities of the servant are secured, the mechanical aptitude is usually lacking.

It is wise, therefore, for owners to consider these matters when engaging or dealing with their chauffeurs. It must be remembered, also, that chauffeurs are drawn from three classes. There is the skilled mechanic, who, fancying the outdoor life and the leisure the management of a car undoubtedly affords, engages himself as a driver, thereby constituting, with many employers, as a servant. This man is ready and willing to accept the burden of such service, only to a certain point, hence there is often a misunderstanding.

Then there is the class of chauffeur who graduates from garage loafer into the position, while lastly there is the class of ex-grooms, valets, or coachmen, who realize the betterment in both position and wages and are trying to learn the automobile, sometimes at great cost to the owner.

The chauffeur's point of view is somewhat curious, depending largely on the particular class in which he may be placed. The really good mechanic considers that his dignity is questioned if he is dictated to. While not infrequently becoming valuable, he is allowed to indulge in more or less familiarity. They resent direct orders, although they may be warranted by their slackness or incapability.

The third class, accustomed to hard service, realize that the beginning and the end of their business lies in maintaining the qualities of a good servant, and are invariably more satisfactory than the mere graduated garage hanger-on or a lazy or slothful mechanic.

The garage proprietor's position with regard to these relationships is a very important factor for the reason that he can do much to prevent misunderstandings. In doing so, laurels are his from both sides, and even if he succeeds in separating the chaff from the wheat he is building up a reputation that will stand him in

good stead among his customers, more than offsetting the loss of the affections of grafting chauffeurs.

May Cause Stiff Steering.

Sometimes the steering will become stiff despite the fact of it being apparently well lubricated. This is particularly the case with cars which have no ball bearings to the steering pivots, though these too will sometimes become unaccountably stiff, despite the fact that all the lubricating places are filled, the passage clear, and everything properly looked after. In all probability if the car be jacked up the steering will be found perfectly free. Of course, if it be not it must be disconnected and the stiffness forced to either the steering box, the steering pivots, or the coupling rod bearing. In nine cases out of ten, however, the mere jacking up of the car and relieving the steering pivots of weight will do all that is required so long as the grease lubricators are all screwed down fairly hard before taking the car off the jacks. The stiffness is simply caused by the weight forcing out all the lubricant from between each steering pin and the socket and also around the ring of the socket. This, of course, is rectified at once when the front axle is jacked up, as the grease can then penetrate between the socket and the pivot pin. While the car is jacked up it is always a good plan to thoroughly grease the bearings of the coupling rod, and also to squeeze plenty of nice thin grease into the steering box and to work the steering wheel up and down several times, so that the grease is thoroughly spread over the working parts inside the steering box. This is particularly necessary when the steering is of the nut and worm type, as this type is more apt to get dry than the more usually employed worm and segment. This intermittent stiffness of steering, due to the squeezing out of the lubricant by the weight of the car, is a most troublesome complaint, though the remedy is simple. Indeed, there are some cars on the road to-day which require jacking up for the screwing down of the lubricators every hundred miles if the steering is to be kept thoroughly free and smooth in action.

Although the above may strike many readers as being a point of very minor importance, it is in reality a matter of more moment than appears at first sight. One has only to drive a hundred miles on a car with easy steering to realize how much this point makes for comfort.

UNIVERSAL FLUXINE.

In using this flux no expensive apparatus is needed to do this work, a common smith's forge with charcoal as fuel can be used, for large and small work; where a great deal of this class of work is to be done, gas, or gasoline fire facilitates the handling of work, and in some cases of extremely large work a combination of gas, or gasoline and charcoal give better heating results. In brazing any article, cast iron, steel, or any metal, great care must be exercised to have the parts clean. Grease, oil, etc., when heated will form a carbonized scale that no flux can remove, take a brush and gasoline to remove grease and oil. The nature of cast iron, and the quantity of carbon it contains makes it the most difficult of all metals to braze, but with Universal Fluxine you can braze cast iron with as much satisfaction as you can steel, or wrought iron with any flux. Heat to a *bright red* and apply plenty of Fluxine; when you have a good coat of Fluxine melted and flowing in about the joint apply the Spelter

and more Fluxine, catch the melted brass and Fluxine in the heated spoon and pour over the work, rub the spoon over the work, particularly at the joint to facilitate in a mechanical way the flowing of the brass and Fluxine into the joint. At a bright red heat, spelter is very liquid and will run out of the joint, therefore add a little spelter as the work cools down, the bright red heat is necessary to flow the flux. Universal Fluxine will weld any grade of steel possible to weld, with less heat than any other flux. In welding apply Fluxine just before you take work from the fire; you can make butt and jump welds with half the work and less heat than with the flux.

For further information address Universal Fluxine Co., Urbana, O.

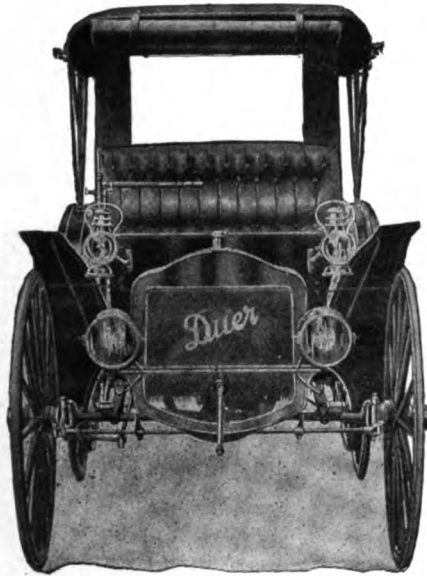
EFFICIENT WELDING PLANTS FOR REPAIR SHOPS.

On an outside back cover this month readers will find a very attractive full-page announcement from The General Welding

Co., 425 Wabash avenue, Chicago. This company has perfected a welding process especially adapted for the repair of broken automobile parts. Metal castings of any kind may be perfectly welded by this process. It will weld aluminum, cast iron, brass, steel, copper or bronze. The General Welding Co. will install one of their welding plants in any automobile repair shop at a nominal expense; and they will send a man to stay with you and teach you all the details of the process, which are not difficult for any intelligent mechanic to learn. After the welding plant is once installed in a shop the operating expense is trifling, and in any busy shop the welding machinery will pay for itself in about thirty days. An adapted form of the new autogenous system is utilized in the machines made by this company, and absolute satisfaction is guaranteed. Write at once for complete particulars to The General Welding Co., 425 Wabash avenue, Chicago, Ill. Mention the AUTOMOBILE DEALER AND REPAIRER.

"THE DUER" 1909 MODEL.

We illustrate at this time a typical high wheeled, solid tire automobile of the better class. This is a very popular car for general utility and it has had an especially large sale in the Middle West. This car is durable, light, speedy, easy to repair and able to travel anywhere a horse-drawn vehicle can go. This automobile is also extremely neat in appearance and not, of course, so expensive as a low-wheeled car



A Fine High Wheel Car.

of equal efficiency. The motor is a 16 H. P. air cooled motor of the double opposed type, with mechanically operated valves of liberal size to allow quick exhausting of the cylinder to prevent overheating. There is no vibrating and all points are very accessible as the motor is located directly under the hood. "The Duer" is manufactured by the Chicago Coach & Carriage Co., 1223 Michigan avenue, Chicago, Ill. This company also manufactures an improved wind shield which has made a great hit with the trade. Write for handsome free illustrated catalog and mention this journal.

AUXILIARY SEATS AND WIND SHIELDS.

Two excellent automobile specialties are offered by the Hill Mfg. Co., of Buffalo, N. Y. One is a folding wind shield with



Auxiliary Seat, No. 12. Made by Hill Mfg. Co., Buffalo, N. Y.

fly screen. This shield is made of one inch brass tubing, with filler board of birch or soft maple, dark mahogany finish. A fly screen is also furnished, and this screen is very durably made of bronze wire. The screen is interchangeable with top half of

glass. There is no bar across centre of glass to obscure the view. In a hot day a fly screen is a luxury which every car owner appreciates as it admits air freely, yet keeps out insects and dust. The price of this screen complete is surprisingly low. Another clever specialty made by the same firm is the neat No. 12 auxiliary seat here shown. This is a revolving seat, round with curved back, 17 inches high, springs in cushion, has round iron base to attach to floor. When not needed may be easily removed and is just the thing for a child or for any extra passenger. Write for catalog and prices to The Hill Mfg. Co., Fuller St., Buffalo, N. Y., and mention this publication.

THE WILLARD STORAGE BATTERY.

A keen recognition of the strong demand for the refinement of electricity and its convenience is shown in the effect and success of The Willard Storage Battery Company, of 5330 Lakeside Ave., Cleveland, Ohio, in providing a practical system of lighting automobiles by electricity. Using their long experience in Pullman car lighting, the Company were well equipped to solve this problem and results to date justify their faith in their ability and in the certainty of the demand among owners for electric lights. The Platino Tungsten lamp, by reason of its strength and ability to stand vibration, is well adapted for automobile service, combining as it does, remarkable brilliancy with low current consumption. The Willard Company, realizing that the ordinary sparking battery had not sufficient capacity for high candle power lamps, have manufactured a modified Pullman car lighting battery which they use for automobile lighting service with very satisfactory results. The Company also furnish fittings for remodeling gas or oil lamps for electricity. A large number of garages are doing a profitable and increasing business in the installation of the Willard Company system.

AN OPPORTUNITY IN IGNITION BATTERIES.

S. Breakstone, 900 Fisher Bldg., Chicago, Ill., is offering for sale a special lot of ignition batteries of a well known make, which regularly list at \$22.50, at the exceptionally low price of \$9.75 each. The reason for this special reduction of price is the fact that an automobile manufacturer, on account of having cut down his output for the present year because of financial conditions, and having contracted for a number of these batteries is forced to dispose of the unused portion of the lot. The battery is a 6 volt, 60 ampere storage battery comprising three cells in hard rubber jars contained in a highly polished oak case, measuring 8 3/4 inches high, 5 1/2 inches wide and 8 1/2 inches long. The cover is held on by brass hinges and can be opened when charging by loosening brass hooks. The electrolyte used in the cells is composed of a solution of chemically pure sulphuric acid and distilled water. This battery it is said will run the car from 1000 to 2000 miles on a single charge. This is a particularly good opportunity not only for owners of cars but for dealers. The battery contains nine plates and is guaranteed for one year.

A NEW AUTOMOBILE VISE.

The F. & R. auto and motor boat vise is unique in the fact that both jaws and both swivels are clamped with one operation of the lever. Nine times out of ten a vise of this kind is almost indispensable during a "break down," where it is impossible to get to a garage or repair shop. Either swivel can be set in any position desired,

thereby allowing the operator to place his work at an angle and always use the entire width of the jaws on a piece of work. Both swivels are fastened or released with one operation of the lever, thereby saving much time. When the work is gripped in the jaws all lost motion is taken up, and it becomes as rigid as any solid jaw

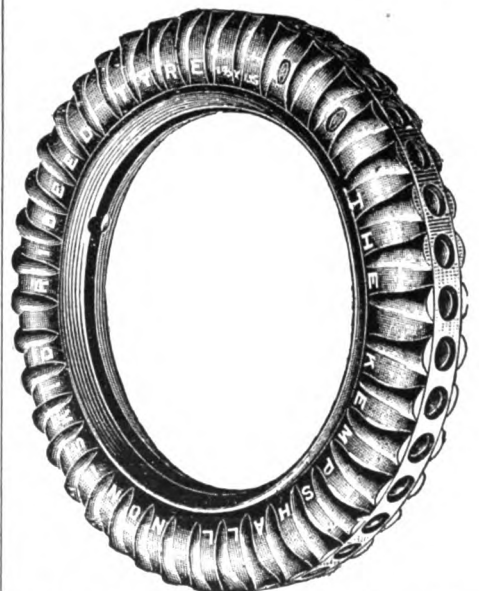


The F. & R. Vise.

vise. The nut and screw are exposed, so they can be easily oiled. The vise is of the best material and can be carried in the tool kit.

THE KEMPSHALL NON-SKID TIRES.

This tire, which is manufactured in England, has recently been introduced in this country; and it has been received with much favor. It is claimed that this tire will never slip or skid on greasy pavements; and that it is practically near-proof, as well as puncture proof. The illustration gives some idea of the way this tire is constructed. The most rigid tests for



The Kempshall Non-Skid Tire. Cryder & Co., 63d Street and Park Avenue, New York City. Sole U. S. Agents.

slipping and skidding show a perfect result. Cryder & Co., Sixty-third Street and Park Avenue, New York City, are sole agents in the United States for the Kempshall Tires and all inquiries should be addressed to them. In writing mention the AUTOMOBILE DEALER AND REPAIRER.

SECRET PROCESS CEMENT AND. REPAIR OUTFITS.

Reader, do you have trouble in getting a rubber cement for tire repair work that gives you entire satisfaction? Then why not try Parks' Secret Process Rubber Cement? It is sometimes called "The Repair Man's Delight." Parks' Cement absolutely (we cannot make this too strong) contains *no acids to corrode* the rubber. No matter where used, it invariably outlasts the remainder of the tire or other object to which it is applied. Impossible, you say. Not at all. Because it practically *vulcanizes without heat*. The patch sticks. It cannot do otherwise. Heat applied to inner tubes is *ruinous*, takes the life out of the rubber, rendering it susceptible to cracks. Every particle of it has the superlative



quality of adhesiveness. The many thousands who have used it testify that they save 25 to 50 per cent. in quantity.

The price is right. The lowest possible consistent with the highest grade article. This cement is far past the experimental stage. It has been in use for the past four years. Patrons have increased steadily since the product was placed on the market.

It is especially recommended for work on automobile tires. The hottest day in summer doesn't phase the patch or plug put on with Parks'. The racing car has yet to be made that can go fast enough to effect it.

To the readers of this journal a special offer is made on this cement. A generous sample will be sent by express prepaid on receipt of 50 cents. This offer may not always be open. Avail yourselves of it now before you forget, and send the 50 cents to F. B. Parks Co., 173 Prescott St., Grand Rapids, Mich. Cut out this notice and send it in with the money, or mention this journal. See the important full page ad. from F. B. Parks Co. in this issue and read about his wonderful "repair outfit." We refer you to this ad. for particulars which it will richly repay every car-owner, dealer and repair man to read carefully.

LATEST THING IN SLEEVES.

As a "first aid" to the injured tire the Wiles Tire Sleeve, here illustrated, fills a long felt want. Tire trouble will come and all motorists will appreciate this quick and lasting repair. That the Wiles Tire Sleeve has met with unanimous approval is well evidenced by the fact that, though it is of comparatively recent invention, the manufacturers, The Diamond Rubber Co., are pushed to the limit to satisfy the demands made upon this department.

It is claimed by the Diamond Rubber

Co. that the Wiles Tire Sleeve meets every requirement and has points of superiority in that it is quickly and easily applied, covers every portion of the tire exposed (fitting closely to the rim) and is equally as good for rim cut or blow out as for tread puncture. Further, the quality of

The Wiles Tire Sleeve. 

rubber and Sea Island Fabric used in its construction gives it the highest degree of wear-resistance. The Wiles Tire Sleeve can be put on in an instant, requires no lacing and absolutely will not creep after being applied. Mr. F. H. Harris, of the Diamond Rubber Co., says "Everyone who has seen or used the Wiles Tire Sleeve is astonished at its effectiveness and simplicity. More than one motor enthusiast has said, "Why didn't I think of that myself'."

M. & M. CEMENT AND ACID CURE SOLUTION.

Motoring is a pleasure if the car-owner does not have to worry over tire troubles. The great object of the M. & M. Cement and Acid Cure Solution is to get rid of all this worry. This is a preparation designed so that any novice can make tire repairs as well as an expert. The man who worked out the formula is an old autoist, who has encountered the puncture proposition hundreds of times. M. & M.



For Tire Repairs.

is a cold process, no heat being required. It makes a repair permanent, as it produces the same effect as vulcanization. The acid cures the cement to the rubber or part to be repaired, making one solid piece, impossible to separate without tearing. The M. & M. outfit, herewith illustrated, consists of $\frac{1}{4}$ pint of cement $\frac{1}{4}$ pint of acid, cement brush, acid brush, emery cloth, etc., packed in a neat slide-cover wooden box, handy to carry in the auto tool box. This preparation is handled by nearly all dealers. but readers are requested to write direct for full information to The M. & M. Mfg. Co. (key no) Main St., Okron, Ohio. Please mention this journal.

Subscribe to the "Automobile Dealer and Repairer," \$1.00 Per Year.

GLOBE STEEL BOXES.

Every car-owner knows the value and necessity of good tool boxes and battery boxes. Boxes used in motoring get a great deal of hard usage and steel boxes are the most satisfactory. We can cordially recommend the large and complete line of steel tool and battery boxes made by the Globe Machine & Stamping Co., of Cleveland, Ohio. It is not invidious to say that these boxes are regarded in the trade as of standard excellence. The illustration gives but a faint idea of the neat and handsome appearance of the Globe boxes, and their durability and utility are beyond dispute. These boxes are made in a very great variety of size and style and to suit every purpose where a box may be needed on the car. The same people make high grade foot rests, robe rails and brass han-

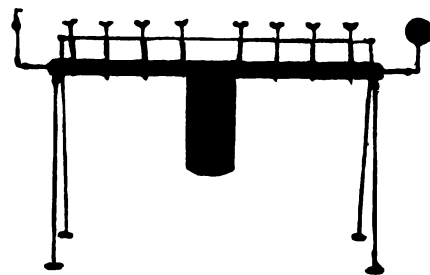


A Fine Steel Box.

dles. Every reader should send for illustrated catalog. Write to Globe Machine & Stamping Co., 3870 Hamilton Ave., Cleveland, Ohio, and mention this journal.

MILLER'S INNER TUBE VULCANIZER.

In this connection we illustrate a vulcanizer just brought out by Charles E. Miller, of Anderson, Indiana. It has a machine surface, highly polished, 54 inches long and 4 inches wide, has a hole cored through so that valve stems can be vulcanized on by putting the valve through this hole. All kinds of flat vulcanizing can be done on this vulcanizer, such as repairing inner tubes, water bottles, splicing inner tubes, and re-



A New Vulcanizer.

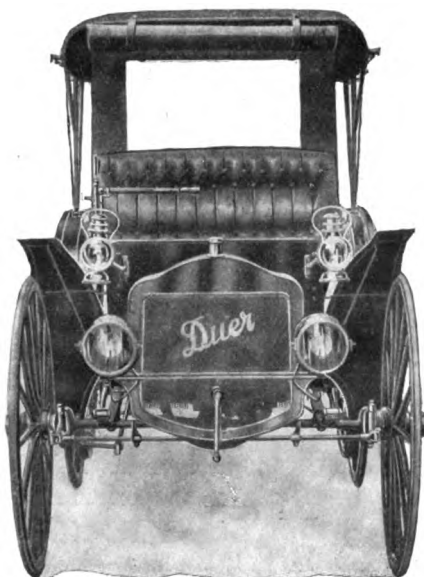
pairing bicycle tires. In fact any kind of vulcanizing that is done on a flat surface.

It is furnished complete with water glass, steam gauge, pop valve, boiler with 12 flues, gas burner and 8 clamps which are movable back and forth for the convenience of the operator and are held in place by the bracket they slide on when not in use. They also furnish two sizes of molds which set on the plain surface of this vulcanizer and are the shape of an automobile tire tread, used for vulcanizing small cuts in all sizes and makes of automobile tires. This vulcanizer can also be furnished with a gasoline burner for \$2.50 extra.

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is the best designed, best built and most practical car on the market to-day for seven big reasons, namely:

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The fact that the constant vibration of the car will loosen, open or shake off anything that is capable of being jarred out of place should not be overlooked. Cocks and taps should always be carefully watched for if they are not tight they will surely jar open.

See that the storage batteries are always held tightly in their box, and that all connections are tight. Rubber sheeting is a good material for packing the batteries and deadens vibration.

The smaller the proportion of gasoline the more economically the motor will run and the cleaner it will keep. This can, of course, be carried to extremes and the efficiency of the engine interfered with; but the proper feed can be determined without great difficulty.

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END OF A PATENT SUIT.
The end of a long drawn out legal battle between the Consolidated Rubber Tire Company and the Goodyear Tire & Rubber Company of Akron, Ohio, occurred when the Supreme Court of the United States, on March 8th, denied the certiorari petition of the Consolidated Company. This suit was begun against the Goodyear Tire & Rubber Company for infringement of their patent on solid rubber tires in the Spring of 1899 in the United States Circuit Court at Cleveland, Ohio. In October, 1901, a decision was rendered adverse to the Goodyear Company. This case was appealed, the Goodyear Company furnishing a bond of \$100,000. On May 11th, 1902, the Court rendered a decision reversing the lower Court. The Consolidated Company then made application for a hearing to the

Supreme Court of the United States, their petition being denied.

About two years ago, the Consolidated Company obtained a favorable decision against another rubber tire manufacturer which resulted in conflicting decisions in courts of equal jurisdiction. Taking advantage of this situation, the Consolidated Company applied to have the Goodyear case reviewed by the Supreme Court, but its petition has been denied as stated.

Accordingly, the Goodyear Tire & Rubber Company now state they are free to sell solid rubber carriage tires in any portion of the United States or its territories, although through a peculiar construction of the law the outcome of this case is said to in no wise effect other rubber tire manufacturers or their customers.

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Refuse absolutely inferior goods at a so-called "cheaper" price. They are more expensive in the end.

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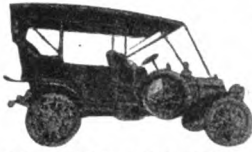
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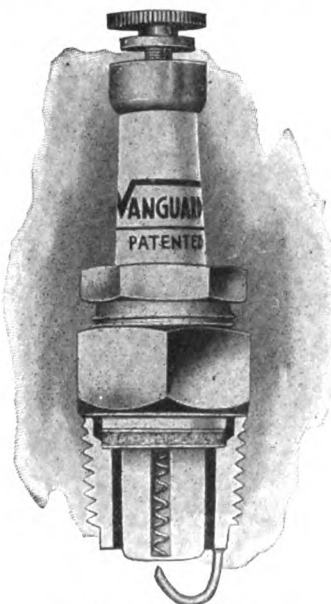
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One of the most important of recent inventions is a spark plug which, it is claimed, can not be fouled or short circuited by water, oil or carbon. This spark plug which is shown in the accompanying illustrations has been patented by the Vanguard Manufacturing Company of Joliet, Ill. That the Vanguard spark plug really is proof against fouling matter seems to be borne out by the fact that it was given the most severe test possible, namely an extended demonstration before crowds of visiting dealers at the Chicago Automobile Show. That the dealers were skeptical goes without saying, and it was only after the Vanguard plug had been subjected to



The Vanguard Spark Plug.

such tests of efficiency as would never be expected, or called for in the ordinary spark plug, that it was conceded—enthusiastically conceded that at last the end to spark plug troubles was in sight. This will be most welcome news both to automobile owners and dealers, as well as to users of motor cycles and motor boats. The Vanguard Company guarantees their spark plug not to quit sparking on account of any kind of fouling matter and it will be sold to dealers under this guarantee. It is interesting to know that the Vanguard Company will adhere to their rule of popular prices and places the new spark plug on the market at \$1.00.

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They will spark under any conditions. Guaranteed for 800 miles. Half-inch standard size, price 55 cents.

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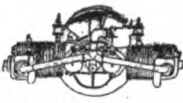
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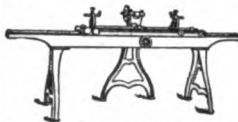
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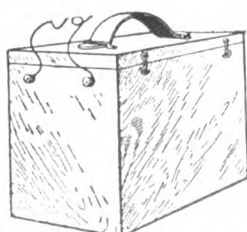
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Afford absolute protection against cuts and tears in heavy rubber shoe. No chance for water or dirt to get in and rot the fabric.

Cheaper in every way to use Woodworth Treads than to retread the tires. Retreading means vulcanizing. Vulcanizing burns the tire fabrics, weakens the tires and decreases their durability.

Woodworth Treads are not vulcanized to the tire. They slip on easily and readily and are held securely in place by spring steel wire hoops. Practically invisible when the car is in motion.

Add thousands of miles of service to new tires and hundreds of miles to old tires which would otherwise be unfit for use.



ADJUSTABLE

May be instantly detached and placed on new tires when the old ones become entirely useless.

Made of thicknesses of strong, pliable chrome leather, thickly studded with flat, round-headed steel rivets. Present an impenetrable surface to jagged stones, sharp bits of metal, nails, broken pieces of glass, anything which would pierce or cut the unprotected tire.

Prevent overheating of the Tire. Steel studs act as conductors carrying the heat from the inside of the tire out.

There are many worthless imitations on the market. **Woodworth Treads** are the only

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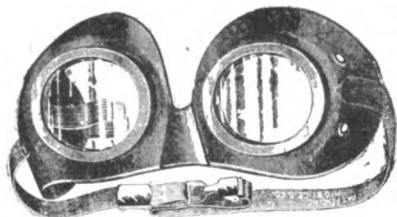
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THE FRY SPARK AND MAGNETO PLUG.

This plug, herewith illustrated, is now handled by the Standard Sales Co., 1779 Broadway, New York City, successors to the T. C. & W. L. Fry Co., of Rochester, Pa. Mr. J. Stewart Smith, formerly con-

nected with Mr. Emil Grossman in his various enterprises, is the new manager of the Standard Sales Co. The Fry plug is made in either open or closed-end type and with either mica or porcelain insulation. The centre electrode is of a composition of the highest heat resistivity and the outer shell is of machine steel, the firing points of the plug being therefore indestructible. The porcelain insulator is



Fry Spark and Magneto Plug. Sold by Standard Sales Co., 1779 Broadway, New York City.

packed with a copper asbestos-filled gasket which bears upon the flat surface of the lower shoulder, corresponding in shape to the lower end of the packing gland. This packing gland is made of brass which prevents it freezing to the steel shell. This form of construction enables the porcelain insulator to be changed in the shortest

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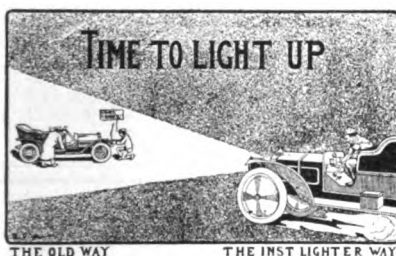
We make everything you need for Tire Repairing. Every article is GOOD. When you put on a patch or attach a tread it goes on quickly and STAYS PUT when you use



Repair Materials. If you have fussed over a repair for an hour because of poor cement and wrongly made patches and then had the work to do over the next day, you'll know what this means to you.

Ask for samples and quotations. We'll send our book, "The Care of An Auto Tire," too, if you care for it.

The Goodyear Tire & Rubber Company
Sprague Street, Akron, Ohio



Light

Your Gas Lamps by turning a gas cock and an electric switch, both located on the dash of your car where you can reach them without stopping or

GETTING OUT

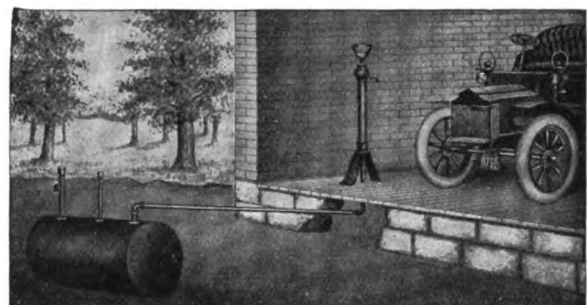
PATENTS PENDING.

GET THE INST LIGHTER

Used with a gas tank—no matches—no adjustment of gas—a delightful convenience—never fails—Your dealer can install it for you. Price \$25.00 installed. Giving perfect service on thousands of the best cars. When buying a new car be sure to order the Inst Lighter put on at the factory. It saves its cost in gas in less than one season. Fully Guaranteed.

SEND FOR CIRCULAR

THE INST LIGHTER COMPANY, COLUMBUS, OHIO



THE underground outfit herein shown is intended to be practicable rather than elaborate. FIRST CLASS material and workmanship at a low price. The tank is heavy galvanized iron connected to pump with twenty feet of $\frac{1}{2}$ -inch pipe. Pump is made of brass and iron, all wearing parts being brass, and has no leather or rubber packing to wear out. It is a plain lift pump and is intended for use only where the oil does not have to be lifted over eight feet from bottom of tank to spout of pump, and the horizontal pipe is not over thirty feet.

This outfit, complete, consists of

- One tank
- One pump
- Three feet of $\frac{1}{4}$ -inch filler pipe and cap
- Three feet of $\frac{1}{2}$ -inch vent pipe and cap
- Twenty feet of $\frac{1}{2}$ -inch pipe
- Two $\frac{1}{2}$ -inch elbows

Send at once for Descriptive Circular and Price List

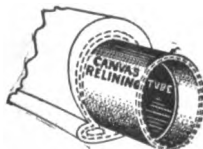
The Wilson & Friend Co.
MANUFACTURERS

3136 So. Canal St., Chicago, Ill., U. S. A.

"THE INNERSHU"

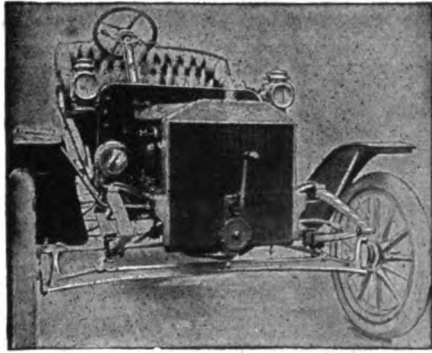
MAKES YOUR TIRES LAST TWICE AS LONG.

Puncture
Proof.
Prevents
Blow
Outs.



Easily
Applied.
Not
Expensive.

The Only Scientific Method to Double Tire Durability.
ASK YOUR DEALER OR WRITE
INNER SHOE TIRE CO., Grand Rapids, Michigan.



Shumard's Front Spring Outfit for Ford Cars.

Patents Pending.

The most decided improvement ever made on a finished car of standard manufacture.

The difference in the riding and operating qualities is noticeable at once, and the surprise is a delight.

The safety of the outfit over the single spring cannot be figured in dollars and cents.

The greatly improved appearance is striking and produces favorable comment. **HUNDREDS ALREADY SOLD.**

Brackets and perches are now made of Vanadium steel with a tensile strength of more than 140,000 lbs.

Springs are the finest quality, tempered in oil, and carefully tested.

Finished, painted and carefully packed in wood box.

Liberal discount to legitimate dealers. Write for further particulars and price to

THE SPECIAL MOTOR VEHICLE CO., Cincinnati, Ohio.

Carburetor Troubles

OUR DELIGHT.

Don't tell them to the policeman. Cussing vile smelling exhaust smoke hasn't made an expert of him. Every Dealer knows that a great number of cars (some high-priced ones) have cheap, ill-adapted carburetors.

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They come to you, Friend Dealer, for help, and if you couple them up to one of our

BALANCED-FLOAT CARBURETORS

They will enjoy motoring well enough to buy a lot of "Luxury trimmings" that you can sell at a profit.

They will burn less fuel, get more speed, and get it anywhere; not even a Corduroy road "phases" the Balanced-Float Gasoline Control. MONEY BACK IF IT FAILS. Tell us you are "A Live One." We will do the rest. CATALOGUE FREE.

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HOW MUCH DID IT COST YOU

last year for inner tube punctures? A great deal, didn't it?

Why not save all this expense by carrying an

M. & M. QUICK REPAIR OUTFIT in your tool kit.

Repairs made anywhere—on the road or at home, and you don't need to be an expert to use it. Just follow directions and you will be surprised how easy repairs can be made that have been costing you from 50c. to \$2.00. With

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\$1.00 For Our Outfit Prepaid.

Manufactured by

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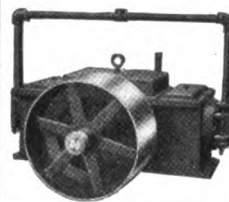
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$\frac{1}{8}$ Inch Shaft and Up. No Fitting. Just Push Them On. 10 Cents in Stamps for Sample.

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AIR COMPRESSORS

Patented
WATER-COOLED GARAGE COMPRESSOR
Weight 300 lbs., a real machine, not a toy.

Also other sizes.

Send for Descriptive Circular and Price List

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Mechanicsburg, Pa.

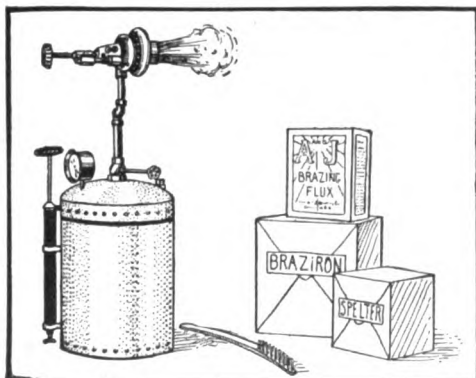


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You can solder cracked water jackets easy with UNIVERSAL SOLDERING FLUID.

Booklet.

Universal Fluxine Co., Urbana, Ohio



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THE "INVINCIBLE"

Ignition Storage Battery

Send for instructive Catalogue and price list
AMERICAN BATTERY COMPANY

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Established 1889

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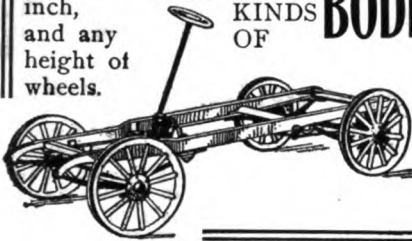
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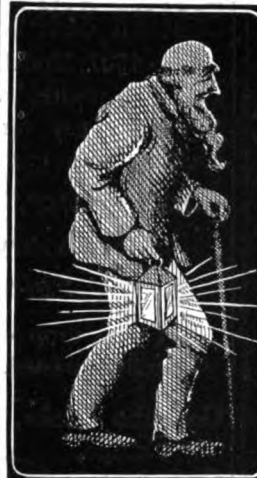
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used Oil Lights
SONNY'S AUTO
HAS
ELECTRIC
LIGHTS

MANUFACTURED BY
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BY ATTACHING OUR

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OVER 15,000 IN USE



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The above extracts from a select few letters recently received give an idea of the range of territory in which the Supplementary Spiral Springs are popular. We have too many to print.

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We guarantee these brand new, clean, fresh, 1908 stock. This lot includes Morgan & Wright, Ajax, Diamond, Continental, Ennis, Pennsylvania, etc. We are selling the lot while they last.

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Eastern Self-Measuring Pump

Our 1907 Model, shown herewith, will quickly pay for itself in any garage.

**Convenience,
Economy,
Safety.**

Not one drop of Gasoline wasted.

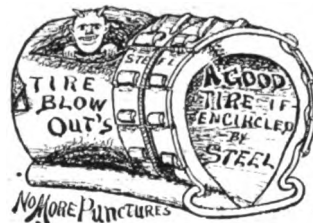
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Complete
Storage
Outfits.**

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PROTECT YOUR NEW TIRES. REPAIR THE OLD ONES.



Tires
Will Last
Forever

Steel Link
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Hooks to
Rim

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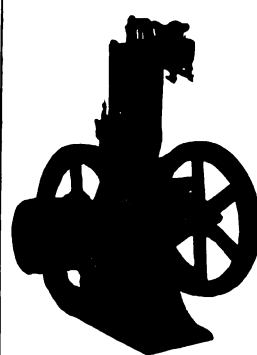
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Gasoline Engine can be used for your machine shop, driving air compressors, dynamos, or any other purpose where a reliable, efficient and economical power is wanted. Built of the best material throughout. They stand up under the hardest service. Write for printed matter. The price is right. We want reliable agents in all parts of the country.
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**CLEAN
OUT
YOUR ENGINE
WITH**

PREST-O-CARBON REMOVER.

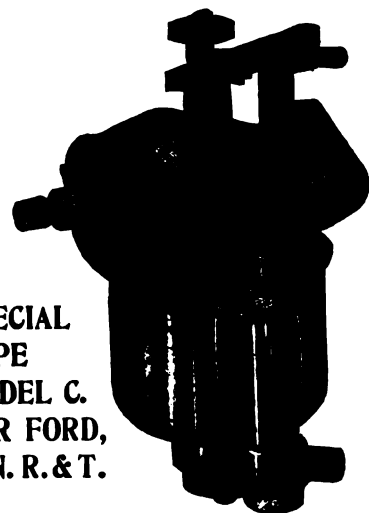
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Gal. \$3.75 1/2 Gal. \$2.00 1 qt. \$1.00

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**SPECIAL
TYPE
MODEL C.
FOR FORD,
S. N. R. & T.**

This, a type made specially for this car, is easily attached and adjusted; no fitting required. Gives more power. Finest throttle control at all speeds. Saves gasoline and runs engine cooler. Is giving satisfaction in cases where four different makes had been tried before ours. Low in price, but high in quality. Satisfaction guaranteed or price refunded. Send for 1908 catalog

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We manufacture MOTORS and TRANSMISSION GEARS
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4 cylinder, vertical, 4 9-16x4.
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4 cylinder, vertical, 5x5.
4 cylinder, vertical, 5 1-2x6.

4 cylinder, vertical, 6x6.
6 cylinder, vertical, 4 9-16x5.
Four and six cylinder chassis to order.

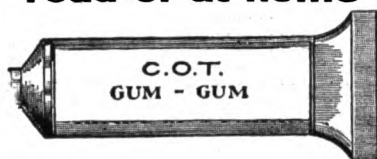
2 cylinder, horizontal opposed, 4 9-16x5 annular ball bearings.
2 cylinder, horizontal opposed, 5x5 annular ball bearings.
2 cylinder, horizontal opposed, 5 1-2x5 annular ball bearings.
2 cylinder, 4x4, 4 1/2x5, 5 1/2x6 and 6 1/2x7.

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A STICKING SUCCESS

Can use it on the road or at home

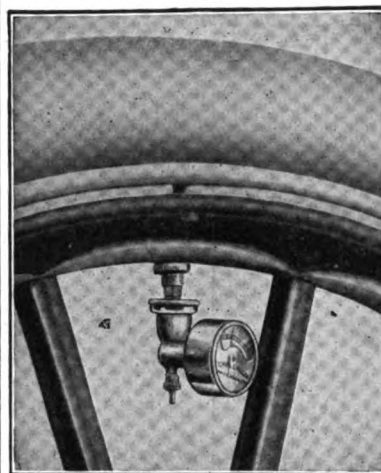


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A Four Ounce Tube, 50 Cents.
Send for Circular.

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ESTABLISHED 1896.

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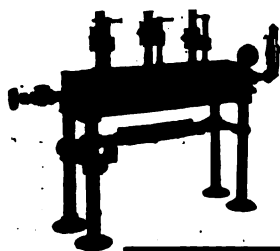


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\$10.00 Will enable you to REPAIR YOUR OWN TIRES. **\$10.00**
THREE TIMES THE LIFE.
A NECESSITY FOR EVERY AUTO OWNER.

FREE Send for our Booklet "TIRE TROUBLES," with description of Vulcanizer, to-day.

BUFFALO ELECTRIC VULCANIZER CO.,
327 ERIE CO. BANK BLDG., **BUFFALO, N. Y.**



The "Boilerless" Steam Vulcanizer

NEWEST RELATIVE OF THE "EXCELSIOR."

Underneath the square semi-steel body is fitted our special gas burner, thus doing entirely away with boiler for inner tube work.

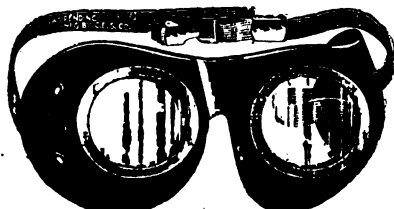
Furnished complete with steam gauge, safety valve, filling valve, air cock, and our well-known quick acting clamps. **LOW COST. HIGH SATISFACTION. Immediate Shipment.**

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64-66 SOUTH CANAL STREET, CHICAGO, ILL.

CHICAGO

From \$3.00 to \$8.00
per dozen.

Nothing like it on the market.



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Ask your jobber for same.

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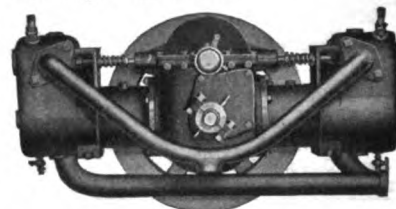
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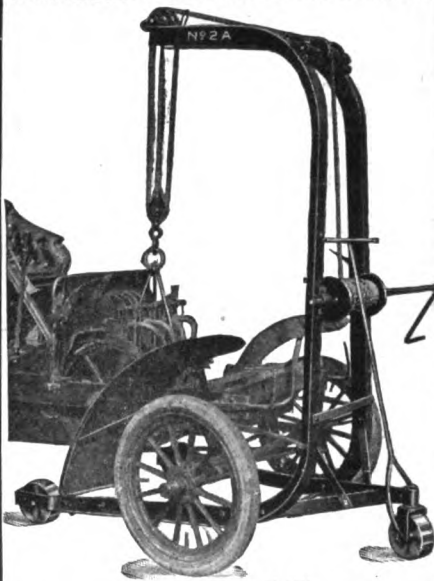
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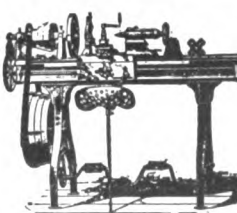
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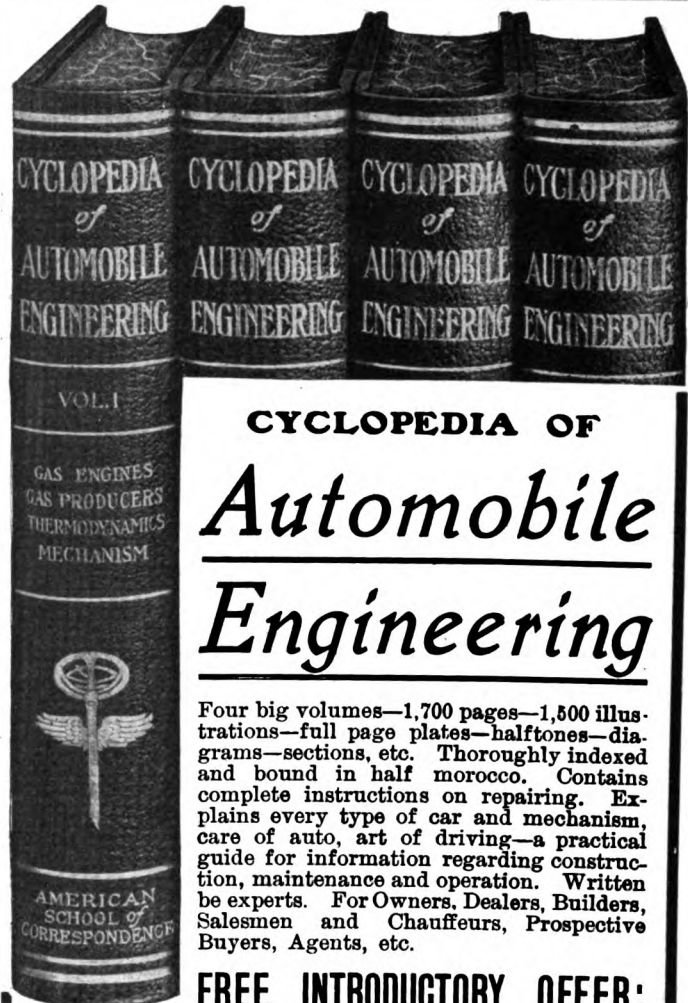
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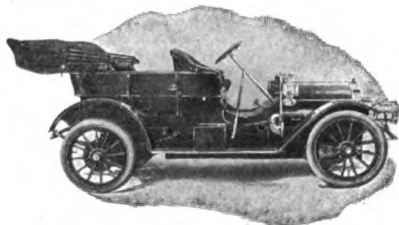
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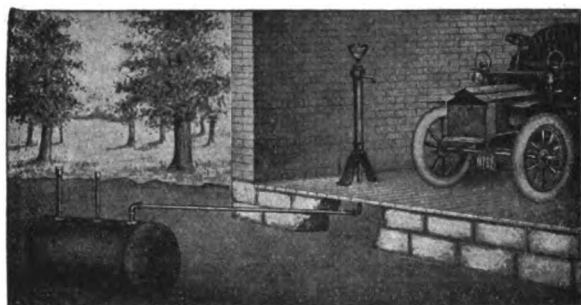
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Chicago, Ill.



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This outfit, complete, consists of

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- One pump
- Three feet of $\frac{1}{4}$ -inch filler pipe and cap
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- Twenty feet of $\frac{3}{4}$ inch pipe
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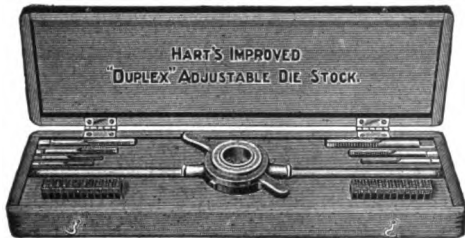
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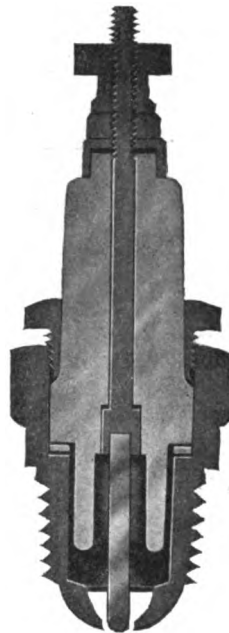
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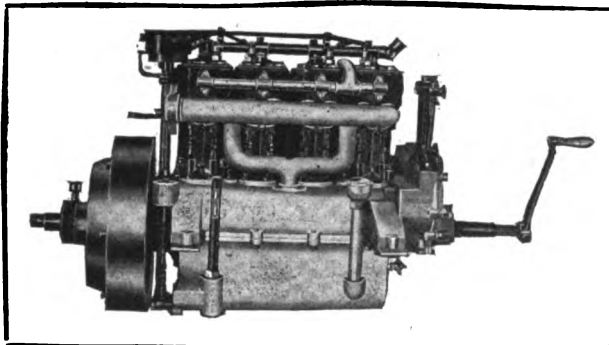
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Standard Sales Co.

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Model "M-4" 20 H. P.

RESULTS

The **KIRKHAM** Motor was used in the most economical water cooled car in the Long Island Auto Club Economy Contest, Feb. 25th, 1908, carrying five passengers 246 miles on 12 gal., 3 pts. gasoline. Weight of car, 2100 lbs.

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Now, does this make you want to know more about these motors? Catalog.

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VOL. VII., No. 3.

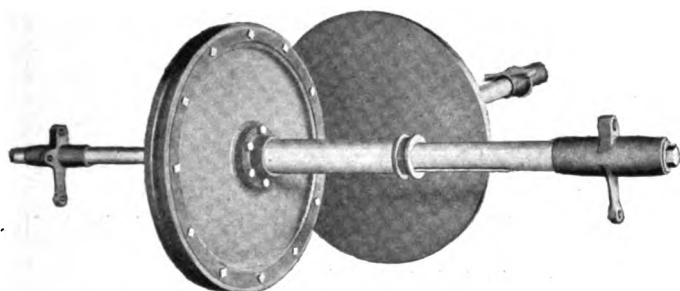
NEW YORK, MAY, 1909.

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SWEEPING CHANGES.

A New Gearless, Valveless, Clutchless Two-Cycle Air-Cooled Motor Car.

The most sweeping and organic change that has been made in design and construction since automobiles began to be popular has been taken by the Kearns Motor Buggy Co., of Beavertown, Pa., and with a view of giving new and what may be called daring productions and inventions as much space as seems of value



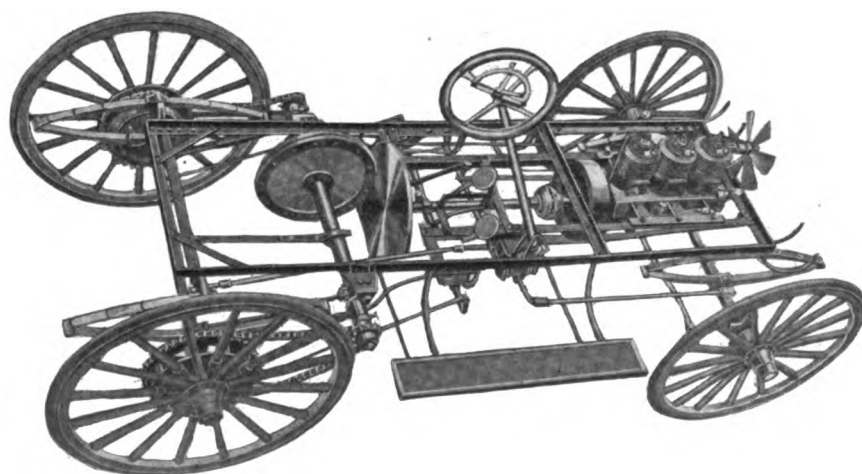
The transo-differential, showing the driving disc and the independent driving pulleys.

to our readers, we take pleasure in illustrating their new car.

It is not only gearless, valveless and clutchless, but it uses a novel two-cycle engine which is air cooled, and employs friction transmission. In a combination of the transmission and the differential into what the manufacturers call a "transo-differential" the result is a simple combination of two well known elements of automobile construction. It is claimed that this

this car, is so well known and has been so thoroughly demonstrated, for years, in all branches of work requiring rapid and efficient transmission of power, that it needs no explanation. It may, however, be difficult to understand thoroughly how the transo-differential does the work of the differential, which is indispensable in the automobile. This is accomplished by dividing the driven pulley into two distinct and independent halves, revolving on the same axis and driven by the same disc, but independently, and each connected to a rear wheel by a side chain. In turning a corner the power is transmitted to the wheel giving the least resistance on the ground (which is, of course, the wheel describing the greater circle) causing its driving pulley to "run ahead" (so as to speak) of its twin, and causing the slower pulley to slip on the face of the driving disc. When running in a straight line, and the ground friction on the wheels is practically equal, the effect on the twin pulleys is as though they were bolted together and the driving friction surface, centers at a point midway between the respective surface centers of the driving pulleys and the wheels travel at the same rate of speed.

The engine used is unique and worthy of more than a passing mention. It is called the "Speedwell," and is of the two-cycle three port type, getting a power impulse at every revolution of the fly wheel. A two-cylinder two-cycle motor gives two power strokes to every revolution of the flywheel, a three-cylinder two-cycle giving three power impulses to one revolution, which results in an extremely steady motion, enabling them to pick up from an overload, such as often occurs



Model L chassis with a three cylinder motor. Other models have two cylinder motors.

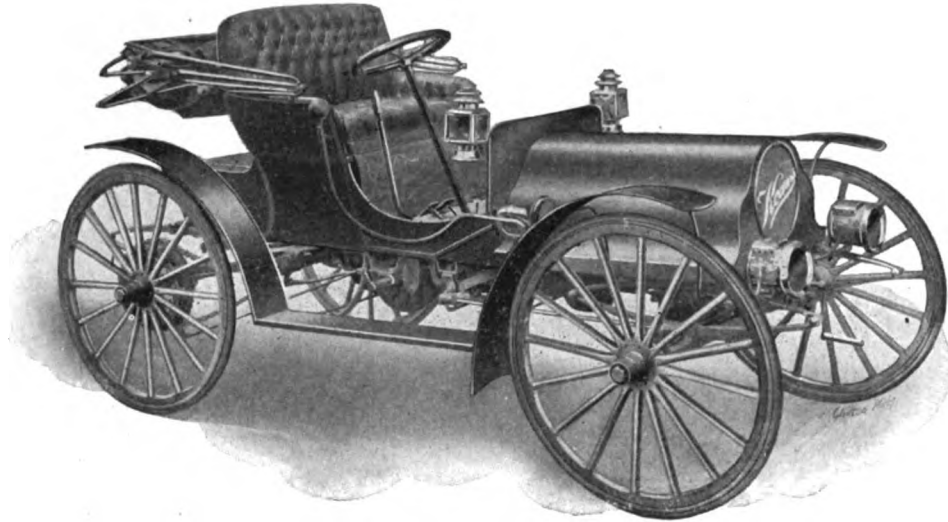
device transmits 97 per cent. of the engine power to the wheels, and if it accomplishes anything like this claim it is worthy of the highest praise. In this transmission there are no gear teeth to strip, no spur gears to lock, no gear cases to require lubrication and attention, no dead weight to carry, although it performs the functions of all of these supposed necessities.

The principle of friction disc drive which is used in

on rough roads where a four-cycle might be stalled. The piston in a two-cycle motor acts as an air pump, valve and compressor, doing away with the poppet valves, which in the four-cycle must be mechanically operated by cams, eccentrics, rods, etc., with the attending noise, wear and adjustment troubles. The cylinder is cooled externally by positive means, "by enclosing the cylinders in a conical shaped casing so that

the air must pass exactly over each cylinder and cool the rear one as efficiently as the front one." It is an acknowledged fact that the piston is the hottest part of any motor, and in the Speedwell the cool charge from the carburetter is forced directly against the underside of the piston head, where it passes through

Motor, three-cylinder two-cycle, air-cooled, 18 horse power, bore, $3\frac{3}{4}$ x 4 inches.
Carburetter, Buffalo.
Gasoline supply, 12 gallons.
Control, spark and throttle through steering column.
Transmission, friction.



Model L. Although this car sells at a low price, its appearance betokens comfort, simplicity, durability and speed.

projections which keeps the head at a lower temperature than many water cooled motor pistons. The charge is not simply drawn through the piston, but is forced directly against the head of the piston.

Illustrated herewith will be found the more important

Steering, wheel 16 inches in diameter.
Drive, chain to each rear wheel. "Baldwin Roller type."
Axles, $1\frac{1}{4}$ -inch ball bearing.
Wheels, 36 and 38 inches.



Model and top especially designed for physicians and business men.

features of this car. This publication has not been asked to indorse, describe or give space to it in its columns, but it is done gladly, knowing it will interest our readers. Whether it will meet the requirements its construction indicates is another matter, but we see no reason why it should not. The following are specifications of model L:

Frame 2 x $2\frac{1}{2}$ inches, angle steel.
Wheel base, 90 inches.
Road clearance, 15 inches.
Tread, 56 inches, standard.
Tires, $1\frac{1}{2}$ inches solid rubber.
Springs, four full elliptic, especially designed for the side motion which cars are subjected to.

Brakes, internal toggle expansion on each rear wheel; emergency by throwing the friction on the reverse.

Spark coil, Connecticut, mounted on dash.

Muffler, "Yankee" 24 inches.

Weight, 1100 pounds.

Upholstering, genuine "Pantasote."

Body, special hand made.

Speed, 1 to 40 miles per hour.

Color, body green and black; gear, red.

Bearings, bronze and ball bearings.

Fan, aluminum front of motor casing.

Width of seat, 36 inches inside; body, 30 inches wide.

Top, 28 oz. rubber cover, dull finish rubber lining.

Lamps, three oil, two acetylene and generator.

ALL ABOUT LUBRICANTS.

The Kind of Oil to Use and How to Test Its Qualities.

BY SYDNEY F. WALKER.

In previous articles, the writer has endeavored to give some practical hints as to the lubrication of the different parts of motor cars. He has laid it down very strongly that different oils must be used for different work, and that cheap oil is bad. The question naturally arises, how can one know good oil? One reply to that is, deal only with first-class makers of lubricants, or at any rate, until you have acquired such a mastery of the subject that you can easily and quickly tell the different qualities of the different substances offered you. Traveling salesmen in oils are almost proverbial, and every one claims that his is the very best oil that was ever produced, that his firm does the largest business that was ever done, and in many cases they wind up by saying, that their stuff is the cheapest on the market. Any dealer who claims to have the cheapest oil on the market, should be received with suspicion, for the reasons that have been given in the previous articles. Unless there are very special con-



Fig. 1.

ditions for buying or preparing the lubricants, cheap lubricating oil must be bad lubricating oil.

For the purpose of knowing oils quickly, the senses may be employed. There are several points in which it is important that oils shall come up to certain standards, as detailed in the previous articles, viz.: viscosity, absence of acids, non-evaporation at working temperature, and others. In the first place, the color of an

oil is an important guide, to a certain extent. It is not wise to be guided by color alone, because oils can be colored as well as other substances. Also, the colors of oils suitable for lubricating different parts of the apparatus vary. It will be wise, therefore, for the

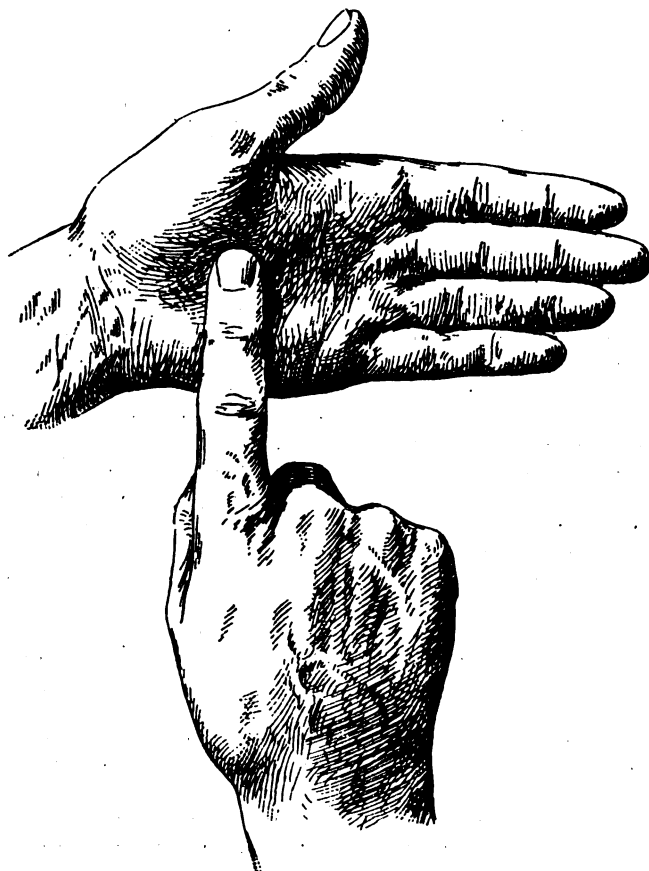


Fig. 2.

motor car repairer to make himself familiar with the look of different kinds of oils adapted for the lubrication of the different parts.

Again, the question of the color and the look of the oil varies according to the conditions under which the oil is seen. Oil in a small phial bottle has an apparently different color from the same oil when poured out on the palm of the hand, say, or the stain which it gives to a piece of ordinary writing or blotting paper. All of these, however, are useful tests. A dirty looking oil would, of course, be immediately rejected.

There is an apparatus on the market for examining the colors of oils, but probably the practical man, using his eyes in the manner described, carefully examining the oil in a small phial bottle, its stain upon paper and the look on the hand, will have a very good guide. In all these cases, the real guide is comparison between the different kinds of oil. It is wise, if possible, to keep a standard sample of the oil that has been found suitable for different parts of the apparatus at hand, and to compare any oils offered with the standard. Again, however, it would be wise to renew the sample periodically. Like a great many other things, oil is subject to chemical changes, and therefore the standard should be renewed at fairly frequent intervals.

Another test that is useful for viscosity, perhaps the most important of all the qualities of oil, is the fingers. Rubbing the oil between the fingers, as in Fig. 1, or rubbing a little of it with one finger on the palm of the hand, as in Fig. 2., or on a smooth metal surface, will give a very fair idea of its viscosity, pro-

vided that the experimenter has the necessary practical experience. A novice coming fresh to the subject would learn nothing from tests of this kind. And again, great care must be taken when making tests of this kind to have the fingers employed in exactly the same conditions. A rough finger will not give the same indications, for instance, as a smooth finger, and in practical fitting shop work it is rather difficult to keep fingers smooth. It may be accomplished, however, by the aid of soft soap and pumice stone. Where one has to choose oils frequently, it should not be difficult to keep, say the top of the forefinger in a condition to give the best results. Viscosity may be tested more certainly with a rough and ready home-made apparatus of the following kind:

Take a small glass funnel and draw the end of the tube attached to it down to a rather fine point, so that the hole in the tube is fairly small, as in Fig. 3. Then if the funnel be filled to a certain mark, the time required for it to empty through the capillary orifice will be a rough and ready measure of its viscosity.

Taste is also a very good guide in the choice of oils, though it sounds a somewhat barbarous one. The writer understands that in firms who do a large business in oils, the sense of taste is often largely employed in testing. It is a test very easily and quickly applied, providing again that the tongue and palate are kept in the proper condition. Tasting, it will be remembered, is the method employed in judging of tea, of wines and other things, and the tongue is a very valuable instrument in anything of this kind. The tongue, for instance, should quickly detect the presence of acid. Again, however, experience is necessary. The man who has never tried to test oil and whose tongue is not experienced, will probably not get much information except in very bad cases. On the other hand, the man whose taste is cultivated, will get very valuable information, and will be able to

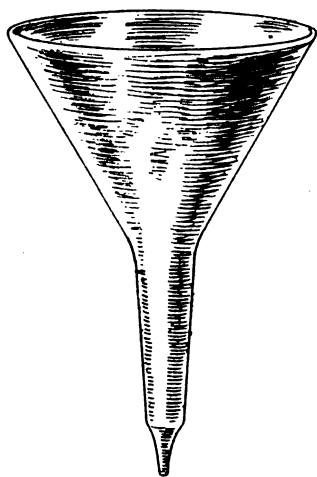


Fig. 3.

judge quickly of oils submitted to him, just as the tea and wine tasters are.

Another simple test for viscosity is the inclined plane, which can easily be made in the works. A piece of board may be carefully planed and its surface made quite smooth and be fixed up so as to be at a certain angle, as shown in Fig. 4. Then if a globule of oil be dropped upon the top of the plane, and the time noted that the globule requires to reach the bottom of the plane, another valuable indication will be obtained of its comparative viscosity.

Another test is specific gravity. The hydrometer

is well known, and there is another apparatus sometimes used by oil blenders, which is really a modification of the hydrometer, called the oleometer. It is really a hydrometer with a small scale covering the probable range of oils. Specific gravity is not a test of oil in the sense that viscosity or evaporating points, or the absence of acids are, but it is a useful guide. Where a firm has been purchasing oil from oil blenders for a number of years, a specific gravity test is a pre-

GLOBULE OF OIL →

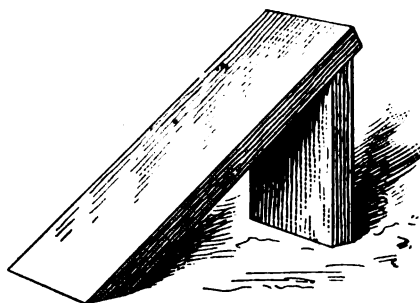


Fig. 4.

liminary guide as to the constancy of the oil. A considerable change in the specific gravity of any quantity of oil supplied should lead to its quality being suspected, and to very careful tests being applied.

UPKEEP ECONOMY.

How One Man Reduced Expenses By a Little Care and Forethought.

As is well known, the cost of the upkeep of a car used and stored in New York City is higher than in any other place on earth, but Mr. R. F. Ayres has undertaken to reduce this expense and he explains how he did it for the benefit of others. He says:

"I purchased a Palmer-Singer thirty in 1908. It was a demonstrating car and had been driven a good many thousand miles. There was no opportunity to have the car overhauled at the time, so I drove it as it was. The car was a little larger than the average thirty and although equipped with runabout body, occupied as much space as a five-passenger touring car.

"My first problem was to find a garage to make a price concession. I had no intention of paying \$45 a month, as I had been told I would have to pay. That is all right for the chap with a big seven-passenger 60 horse power car, but not for me. I believe there are 9,000 garages in New York City. When I began to look for them I found them on every block. Two-thirds of the garages were by no means full. Although the season was open, the weather ideal, and I had just got the car, I put it on dead storage. What do you think of that? Dead storage at \$5 a month in a garage not very far from Broadway and Sixty-sixth Street!

"I have seen better garages, but the fact that this meant only \$5 a month appealed to me. I made a bargain that I could take the car out whenever I pleased, and that on the payment of \$1 I could have it washed and polished. That storage keeper was getting an average of \$25 a month from about thirty other customers. I had the car washed only twice a month. More is a useless extravagance.

"Here, then, was an item of \$7 a month. My gasoline, I am free to admit, was far from being a bargain. I might have saved some money by purchasing in

large quantities, but I did not care to do this, so I paid 42 cents a gallon for gasoline.

"I had been pretty thoroughly into the subject of cylinder oils, and allowed myself the luxury of purchasing about the highest priced oil on the market, because I knew it was good for the car, and the results proved the wisdom of my choice. Oil costs me, roughly, 25 cents a trip, as I paid \$1 a gallon for it and used for the car about a quart each time I took it out. Gas at 22 cents a gallon costs me about 80 cents for every trip. By a trip I mean a ride of fifty miles or so, of which I made about three a week. In addition to this there were constant evening rides in the Park and about Riverside Drive. It cost me between \$5 and \$6 a week for gasoline and about \$2.50 for washing and polishing the car and the week's share of the monthly \$5 garage bill, or a total of \$7.50 a week for upkeep.

"Repairs and replacements there were none, except for tires. I had accumulated two extra shoes, paying \$7 for one and \$3.50 for the other. The \$7 shoe was a second-hand Michelin, which had been run 1,500 miles and patched in two places. That shoe is on the car to-day giving perfect service and carrying the same air which I pumped into it last Fall.

"Upon my family returning from the country in the Autumn it became necessary to engage a chauffeur. At that time, too, the garage where I had been keeping my car on dead storage failed, and my car was unceremoniously pulled out into the street. I rescued it and placed it in another garage on the same street on the dead storage basis, but this time it cost me \$10 a month.

"The chauffeur problem seemed a difficult one at first. A little thinking and some inquiry throughout the trade enabled me to secure an excellent man for \$7 a week. He got \$40 in his last position, and was worth every cent of it. He was at that time out of a job, as were fifteen or twenty other excellent men, as I soon found out. The \$7 a week which I paid him was really nothing but pocket money for him, but it enabled him to keep busy and take plenty of time to look around for a good position. He stayed with me two months before going with the owner of three cars at a higher salary. I filled his place for another two months with an Englishman who was out of work. He was an exceptionally good man and had driven no end of foreign and standard American makes.

"Now, as to repairs and replacements. To be brief, there were none. When I first got my car I determined to familiarize myself with it from a mechanical standpoint. Lifting up the hood I found it was full of machinery. I closed the hood. Eventually I learned to put oil, gasoline and water in the proper places and to know when these supplies were necessary. I learned to crank the car readily enough, and soon became an expert driver. I never made an adjustment of any kind, and the car has never needed one to this day. The only cost which I have ever had approaching mechanical expense was to pay 75 cents for replacing the little tube which leads from the Prestolite tank to the gas lamps.

"Cars nowadays are made so that they do not go wrong or give trouble. The owner can rely on a car to run as quietly along for month after month without even having to lift up the hood on the road, provided he looks after oil, gasoline, and water each time before he makes his start from the garage. My total cost for the year for everything, including tires, repairs on shoes, inner tubes, garage charges, gasoline, and cylinder oil, washing the car, etc., was \$300. I paid the chauffeurs \$119 for four months' work, making a total of \$419."

TAKING THE CAR ABROAD.

Information as to Requirements and Details of Shipment.

Those of our readers who intend taking a trip abroad will find the pleasures of a tour in Europe much increased by taking their car with them, although the expense and necessary details should be well considered.

The car owner can use his car up to one day in New York before the steamer sails. On that day he drives it to the pier and the steamship company takes charge of it. There are to-day none of the petty annoyances and inconveniences that formerly attended the shipment of the tourist's automobile on the same steamer that carried him abroad.

The automobilist, if he is sailing on one of the North German Lloyd steamers, should first apply at the offices for a statement of the cost of shipping his car. The items of expense for a round trip from New York include boxing at the pier, customs house service in New York, charge for lifting the automobile into the steamer, the ocean freight charge, charge for lifting the automobile out of the steamer, the unboxing, the custom house charges at the port of debarkation, the storage of lumber (the empty case), insurance of lumber (empty case), reshipping of lumber to another port, if necessary, refund of duties paid, reboxing of car, ocean freight to New York and the United States customs entry at New York.

By running his car to the pier the owner avoids the jolting it would receive if it were carted across New York and saves the cost of drayage. The crates or boxes are built in such a manner that they may be taken apart on arrival abroad and used again for the return shipment of the automobile, saving the cost of a new box that is otherwise required. This arrangement applies primarily to those passengers whose cars are returned from the same port where they were landed, as, when the automobile is returned from a different port, it may prove more economical to build a new crate than to ship the lumber of the old box from the port at which it is landed to the port whence the automobile is to be returned.

In forming plans for a trip abroad it will be well for the automobilist to remember that cars destined for Cherbourg and Plymouth are carried in the upper compartments of the steamer, and upon arrival at either of these two ports the automobile is discharged into one of the Lloyd tenders, one tender being used for the passengers and passengers' baggage, the other tender for the landing of automobiles. The passenger is therefore able to obtain his car within two to four hours after the arrival of the steamer at the port.

A recent ruling of the Treasury Department holds that, upon reimportation, a car previously exported is, under the rule, liable to duty at its full value if repairs amounting to more than 50 per cent. of its original value have been made while the car was abroad.

It is advisable, though not essential, to procure a passport. This is issued by the State Department at Washington upon the payment of a fee of \$1.

The roads in northern and central Europe are kept in splendid repair by a large force of caretakers. The Touring Club of France has a fund for the benefit of disabled road makers, and it is a graceful act to make a contribution to this fund.

If driving in a country where the rule is to keep to the right, remember to place the tail lamp on the left side, and vice versa.

It is essential to give complete information on the

following items to procure licenses and frontier passes in France. This also applies to Germany and Italy:

1. Kind of vehicle—automobile, motorcycle.
2. Maker.
3. Mark.
4. Model and date.
5. Style—touring car, runabout (with top or hood), limousine, landau, landaulet.
6. Number of car.
7. Color, body, chassis.
8. Number of wheels.
9. Make of tires.
10. Number of springs carrying body.
11. Number of seats.
12. Weight, pounds, kilograms.
13. Value.
14. Mark of motor.
15. Number of motor.
16. Motive power—gasoline, alcohol, electricity.
17. Number of cylinders.
18. Horsepower.
19. Speed on level.

In shipping an automobile it is essential to give the following information:

Passenger's name.
 Per S. S., sailing—
 Ship car to
 Chauffeur's name.
 Make bills of lading in name of
 Consign car to
 Value of the car for United States Custom House clearance, \$.....
 Insure automobile against marine risk for \$.....
 The make of car is
 The motor number is
 The chassis number is
 The measurements of car are: Length,
 width,; height,
 The weight of car is pounds.
 (If a foreign car, please fill in the following, too:)
 The car was imported on S. S.
 Custom House entry was effected by Entry No.
 All charges are to be paid at
 Please state if car is to be returned to the United States.

Tire Diseases.

No two tires, regardless of manufactures will wear alike. One will run 3,000 miles or more; another of same make will give down in 500 miles. The reason is in their building. If the gum was securely fastened down to the fabric, it will probably wear full time. If it is not securely fastened all around it will soon be a diseased tire.

The first symptom of disease is a "corn," caused from a puncture of the tread into one of the points of the tire where the gum was not securely fastened to the fabric. This puncture becomes a valve into which the dust creeps at each revolution of the tire and it forces the rubber tread away from the fabric and the dust deposits in this pocket. This collection continues until it becomes a slight lump on the face of the tires.

The development from this stage is rapid. Soon a "bunion" is formed, the size of half a goose egg. The blow-out follows, and it is all over.

To make a bolt turn easy and keep it from rusting, apply grease or graphite to the thread before turning.

A HARD RUN.

But Success Was Finally Achieved by the Use of a Borrowed Magneto.

From "Reader," New Jersey.—Not long ago I had a hard time while on my way from Newark to Philadelphia. I had two friends with me, and we were stranded for several hours about five miles from any town in either direction. It was like this. For some time I have had an idea that the timing of the magneto on my car might with advantage be advanced somewhat. So I had removed the driving "dog" (coupling piece) on the armature shaft of the magneto and shifted it slightly on its taper to a position which I thought would be better. Well, the alteration was a great success, for the car afterwards romped up hills at top speed which it would not take on at that gear previously.

I had a little difficulty in getting the "dog" off and only managed to do so by driving two small wedges between it and the body of the magneto and then giving the end of the shaft a sharp tap in the direction of the wedges. I did not use any great force, you may be sure, but after events showed that it was sufficient to do rather serious damage.

Shortly before the car, as I have said, ran better than it had ever done before until finally the engine, after missing fire erratically for half an hour or so, came to a standstill. Immediately the bonnet was opened to investigate matters a strong smell of burning vulcanite was noticed, and the only accessory of the engine on which vulcanite is used being the magneto, suspicions naturally inclined in that direction.

I therefore removed the latter and took it to pieces, eventually finding that the smell of burning proceeded from the collecting ring of the armature shaft. The vulcanite of this was burned badly on one side, and that being so it was quite easy to account for the sudden cessation of firing—the current had but $\frac{1}{4}$ inch to jump to short to earth.

The cause of the trouble was not difficult to suggest, for I have no doubt that in removing the driving "dog" I had cracked the vulcanite, and the current leaking occasionally at first through the cracks had eventually ignited the vulcanite.

The problem we now had to face was, how to get anywhere, for I have only the one ignition on my car. After considerable discussion it was decided that two of us—myself and one friend—should walk back to the first town and see what the garage there could fit us up with. As you can imagine, during the five miles tramp I had plenty of time to draw a moral from the experience, viz., to be more wary in handling a magneto machine, especially when removing the driving "dog!"

Well, on arrival at the town we found that the garage folk had not a magneto suitable for a four-cylinder engine either in stock or on a car; the only thing in that way they had being one of the same make for a two-cylinder engine with cranks set at 180 degrees. However, after a deal of talk, during which various suggestions—some impossible and others not to my liking (such as towing the car in and leaving it)—were made by sundry individuals, I thought of a plan, the upshot of which was our leaving the garage with the magneto from off the two-cylinder engine and our taking a cab back to the car.

To explain my idea, I must digress somewhat. Now, I don't know whether you are aware of it, but I had had reason to have the fact impressed upon my mind

by some correspondence with the makers of the magneto when I possessed a two-cylinder car that generates a spark in each cylinder more often than is required, and the same applies to nearly all makes, so I understand. That is to say, two sparks, one to each cylinder, take place at the respective plugs in quick succession, but then, instead of there being an interval while the crankshaft makes one revolution, No. 1 again sparks at a time when the piston is at the top, or at the end of the exhaust stroke, and when No. 2 piston is in a similar position a spark takes place at the sparking plug in that cylinder.

To make my meaning quite clear let me explain it in another way. Instead of generating and supplying the current to the plugs, 1, 2 and then another pause, and so on, this type of magneto causes a flash at each plug alternately in regular sequence, 1, 2, 3, 4,—1, 2, 3, 4; "3" is wasted in No. 1 cylinder and "4" in No. 2.

I must say that it seemed a peculiar idea, to my mind, to construct a magneto for a two-cylinder engine which fires four times in two revolutions of the crankshaft, but, as the makers assured me would be the case, it certainly does work quite satisfactorily and enables a cheaper and less complicated form to be used; this latter by reason of the absence of a half-time shaft, timing wheels, distributor, etc.

Well, knowing all this at the time of which I am writing, I thought why should I not fix two wires to each of the two terminals on the magneto we had borrowed, leading those from one terminal to cylinders 2 and 3, and those from the other terminal to cylinders 1 and 4 (my engine fires in the order 2, 1, 3, 4). Thus, each time the magneto came to its firing point, a spark took place in two cylinders; in one where the piston was at the top of the compression stroke as usual, and in the other when the piston was at the top of its exhaust stroke.

I carried out the idea, and although the engine did not perhaps "pull" well and misfired a good deal, the result was quite satisfactory from our point of view and under the circumstances.

I had, of course, some little difficulty in fitting the smaller magneto in place of the large one, and you may be sure that in changing the driving dog from one to the other I did not use wedges to remove it, but borrowed a small double clamp which the garage people had by them.

We reached Philadelphia none the worse for our experience, which was not rendered more pleasing by our having had to fit the temporary magneto in the dark.

Learning to Drive.

Proficiency in driving they may learn by experience, which is mileage. There is no school that will make a careful driver out of a reckless one. The only way to teach a new driver how to drive himself out of tight places is to get him to follow the example of the best drivers, whose cleverness lies in staying out of tight places. The man who is his own chauffeur and teaches himself gets the best pleasure out of motoring when he educates himself along the same lines. Driving he can readily learn. His first aim should be to master enough of the mechanics of his car to save himself the annoyance and expense of trouble arising from neglect and abuse.

Always let off the pressure with a pressure fuel feed when leaving the car for the night.

THE ALCOHOL MOTOR.

The Frankin Company Runs an Alcohol Cab in New York.

An alcohol motor, which was sent out some months ago from the Franklin car factory, has since been used in the propulsion of a Franklin motorcab about the streets of New York. So far as work is concerned it is a commercial possibility, a matter concerning which heretofore there has always been more or less skepticism. It only remains for the makers of alcohol, by more economical methods of production or otherwise, to bring the price of their product down to that of gasoline to make the alcohol motorcar an everyday rival of the gasoline car.

That this is at least a possibility is indicated by the fact that the extensive use of alcohol in a commercial way is new, and that, as in the case of any new product, there is bound to be development in manufacturing methods as well as in use. The fact, too, that alcohol can be made from so much that would otherwise be of little use is further cause for belief that its price will approach that of gasoline.

Many experiments led up to the making of this engine. In the main the motor is a duplicate of the 18 horsepower gasoline engine used on one of the Franklin models. Some change has been necessary in order that the change of fuel might be made a success. The compression is greater, and the air for the carburetor is preheated. A lag jacket is provided for the purpose of keeping the mixture warm in transit from the carburetor to the cylinder. The bore of the cylinder is $3\frac{3}{8}$ inches and the stroke 4 inches.

Repeated tests before the alcohol motor cab was sent out from the factory showed that it could cover as many miles on the same amount of fuel as a gasoline car, and this is the really important factor in the introduction of the new fuel. Changes in price can usually be brought about when there is a real commercial opportunity, but changes of price are absolutely without effect in competition unless equal efficiency is assured for the article or commodity with which it is sought to supplant or rival an established product.

On the side of alcohol is the factor of safety. While it will burn, it is less inflammable than gasoline. It can be left uncovered and will not give off explosive vapors as does gasoline. Accordingly, it is classified by insurance companies as much less hazardous. In some places gasoline motor cars are barred, such as docks, where a fire would be both easy to start and extremely destructive of property, and the prohibition would not be applicable in the same degree to alcohol automobiles.

In all the experiments with the alcohol it has been found that a noticeable feature was an absolute lack of all signs of overheating, both when the motor was running on a test block and when it was running on the road. The fuel was found to produce no bad effect upon the motor.

Of forty chauffeurs' licenses revoked by the Massachusetts State Highway Commissioners during the last four months twenty-seven were for reckless operation, four for using machines without owner's consent and six for intoxication.

Filtering can scarcely be overdone. When replenishing either radiator, fuel tank or oil reservoir the use of a strainer is advised.

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A Magazine of condensed and compact information for busy readers.

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ADVERTISING RATES MADE KNOWN ON APPLICATION

NEW YORK, MAY, 1909.

Missing Numbers—Our readers are requested to remember that it always gives us pleasure to re-send numbers which have gone astray in the mails.

THE NEW YORK AUTOMOBILE BILL.

The Hamm automobile bill, which has already passed the New York legislature and quite likely will become a law by the signature of the Governor before this issue goes to press, is in most respects a law that will meet the approval of car owners, although it has an objectionable feature. We refer to the special tax, which it has been estimated will exact from the automobilists of the State something like \$1,000,000. Now the cost of maintaining and repairing the entire 1,800 miles of good roads of the State during the next year is estimated at only about \$1,500,000, and at this rate the car owners will pay two-thirds of the entire highway expense. This, of course, is altogether out of proportion to their use by the public. It goes without saying that automobiles injure the highways, but the extent of this injury depends very much upon speed and the use of chains and other anti-skid devices.

On the other hand, a car driven at moderate speed—a speed that presses down the road surface instead of tearing it up—is a positive benefit to the highways. But all vehicles injure the highways more or less, and none more than those propelled by horses with sharp shoe calks.

An objection has been made to the law on the ground that it does not provide for sufficient examination for the granting of licenses to car drivers in relation to their mechanical fitness. But this is really of little consequence. A careful man, who is naturally solicitous for the rights and welfare of others, is not likely to meet with an accident even though he knows very little about the running and mechanical principles of a car, and a reckless and selfish one is liable to accident, even though he has a knowledge of the mechanical principles of the automobile and its running at the end of every finger. Wanton recklessness has very little to do with mechanical knowledge.

Neither fixing the rate of speed nor examinations for proficiency in propelling knowledge will do much toward reducing the number of accidents. The best

preventive of these is to fix the most severe punishment for the offenders. And in case they try to avoid the responsibility for an accident by the increasing practice of running off in a cowardly and poltroon fashion, let the severity of the punishment, in case of ultimate apprehension, be doubled.

Using judgment and discretion, and with due attention to the question of speed, there is no difficulty in driving an automobile. It is far easier to manage than a horse.

AUTOMOBILE EXPORTS.

There seems to be a well defined feeling that something is lacking or wrong because the export automobile trade from this country is so small. But if the tariff on imported automobiles is based upon the difference in cost of production here and abroad, it is difficult to see how the American manufacturer can expect to successfully compete with the manufacturers of Europe.

It is, of course, quite apparent that there are made in this country a class of small, low-powered and low priced cars which are not at present found to any extent abroad, and simply because there is no great demand for them there. To help supply this limited demand, quite a number of Ford, Buick, Cadillac and other runabouts have been imported and sold, but just as soon as the demand becomes sufficient, foreign manufacturers will supply it and at less cost than the same cars can be exported from this country. The reason for this is not far to seek: Skilled mechanics in this country are paid about three times the rate of wages that they are paid in Europe.

Nor is the lack of demand in Europe for the small and low powered cars anything difficult to understand. All over that continent the people are really divided into two classes,—if there is a middle class it is too small numerically to take into account,—those who can afford to own large high-powered cars and those who can afford to own nothing in the shape of a vehicle more valuable than a wheelbarrow.

In this country, on the other hand, there is a large middle class which can afford to own small cars at prices ranging from \$400 to \$700. When the demand in Europe for such cars arises they will be supplied by cars made in Europe. Let us not deceive ourselves. We beat the world in the making and using of labor-saving machinery, but only because the high price of labor makes it more of an object to use it than anywhere else in the world. There is nothing in the world to forbid its use anywhere else on earth, and it will be used elsewhere just as soon as its use can be made to pay.

THE OBSCURE POSTAL CARD.

Quite a number of letters have been received in relation to the award of the honorarium for making the correct solution of the obscure postal card, of which details have been given in the two preceding issues. Although in each case they have been extremely good-natured in character, the feeling expressed was that the matter was not decided correctly. In one instance a reader is of the opinion that his transcription was correct because he used the words, "This is no Colles fracture known to doctors," etc., instead of "There is no Colles fracture," etc. It may be stated that the reason for deciding that the word was "There" rather than "This" was that the word "this" denotes something just mentioned or near in the place or time, and the word "there" is used indefinitely as the beginning of a sentence followed by a verb. Nothing else being

mentioned or referred to in the postal card, "There" is obviously the word intended.

The foregoing is but one only of the varying opinions given as to the award of the little prize. To go into the matter more in detail might not interest those readers who look to this magazine solely for information concerning the automobile, and who are indifferent to the transcriptions of obscure postal cards. Thus the subject has been given as much space as it probably warrants and much more than was at first intended.

AT THE TURN OF THE ROAD.

There is no vehicle or piece of machinery under the sun that receives such inconsiderate, wracking and destructive usage as the automobile. The other day the writer chanced to see a car approaching at a lively clip on one of the streets in the suburbs of New York. It was just beginning to get dark and probably the driver could not see very far ahead, rendering care and slow speed imperative. Just at the turn a horse and carriage loomed into view, and the driver of the car turned short to the right. He was not quite quick enough, however, and took off one of the rear wheels of the carriage and then plunged into the ditch. The lesson is obvious. Any driver of a car who does not slow down enough on approaching a turn in the road so that, if necessary, the car may be stopped instantly, lacks an imperative precautionary practice.

Auto Insurance Risks.

Insurance companies writing automobile policies throughout the United States recently have been making investigations into the moral hazard of a risk. The character of the owner of the machine insured is being investigated, where new applications are made, and the attitude of the owner toward insurance is also being inquired into. This investigation, according to resident managers of companies doing automobile insurance, developed out of the fact that so many accidents have occurred which are directly traceable to recklessness, high-speed driving and often to the effects of too much drink.

Another fact which the insurance managers have discovered is that most of the accidents occur after midnight, and usually after the owner or chauffeur of the machine has visited some roadhouse or has been taking a drive on the county roads after having imbibed too freely. At one time some of the agents stated they would advocate the adoption of a clause in the policy that where the accident occurred between midnight and daylight the company should not be liable for any portion of the policy.

The business written on automobile accident and casualty insurance has developed wonderfully within the last few years, and it has been noticeable, according to one of the agents, whose company controls a bulk of the business, that there seems to be a tendency among some of the owners to ask for a heavier amount of insurance on a machine than its real value.

Pedestrian Indecision.

The "Man in the Street" is a mysterious individual who is given to putting his foot down in no uncertain manner at times, though not always with judgment. Very interesting is he to the car, too, who sees him in a rather light in crowded streets. There he is impetuous, heedless, and forgetful, being apparently quite sceptical of the proclivities of the motor car. Indeed, to see him trustfully step into a busy thoroughfare without once looking round to see if the coast is clear, is enough to prove how he welcomes the auto-

mobile as a dear friend, feeling perfectly certain that whatever else happens the car will never hurt him. So childlike at times is his confidence that he frequently places the driver in an extremely awkward position, his erratic movements and uncertain procedure causing the "man at the wheel" no little anxiety.

Of all errant wayfarers he of the indecisive mind causes the greatest anxiety to a humane motorist, his rapid changes of intention being only equalled by his vacillating movements. First he thinks he will cross the road, and starts to stop again in the same breath. Then, urged by fear as he sees the car approaching, he darts forward once more to be again the prey of doubt. More hesitation; followed sometimes by a drive to safety back again on his tracks, or by a wild leap under the car's bonnet to the other side of the road. Such indecision can be noticed more frequently at corners and turnings than anywhere else, and has led to numerous accidents which could easily have been averted. Such incidents have, of course, their serious side, for besides the risk of accidents the irritation and fright of the pedestrian and the strain thrown upon the motorist are enough to leave an unpleasant feeling behind. No doubt in a few years' time, by reason of the laws of the "survival of the fittest," wayfarers will thoroughly understand the automobile, and motorists will no longer be crowned with premature grey hairs.

The Retail Dealers.

Editor of the AUTOMOBILE DEALER AND REPAIRER:

In a conversation held recently with the credit man of one of the large manufacturing concerns whose product goes into every garage in the country, the manufacturer made the statement that the credit among the garage owners was one of if not the poorest lines of credit with which they had to deal.

I have since investigated and am forced to believe him correct, much against our will. But to any self-respecting man in the automobile business it is not a pleasing situation.

There are two questions which arise when this situation is brought to mind. The first is, Why? and the second, How can it be helped? In answer to the first, one has but to think of the lack of ordinary business methods which are adopted by the average garage keeper when he comes in contact with competition. Instead of making his goods his strong argument he begins at the wrong end and talks price and price alone, and the first thing he knows he is lost. The prospective buyer has no interest in the garage man's profit, and when a cut price is named it is only the first start on the path which leads to financial ruin. A promise from a customer to keep a consideration private is a joke, and the efforts, if any, on the garage man's part to recover lost ground are useless. It is an absolute fact that no business on earth can succeed unless there is a reasonable profit, and the sooner the garage men realize this the sooner will they receive the reward to which they are entitled.

The answer to the second question is shown in the results accomplished by organization in the Retail Hardware Dealers' Association, and many others. "In union there is strength." Why not join the association organized for your own special benefit, and help things along? The automobile manufacturers are consolidating. The tire manufacturers have an association. The accessory people have their association. Is the poor little dealer so powerful and mighty that he don't need something similar to what his big brother needs? Send in your applications now. MEMBER.

LESSONS FOR DRIVERS.

Carelessness and Ignorance Responsible for Most Accidents.

Along some of the streets of the great East Side in New York City there seems to be a growing hatred of automobiles, and it has been remarked that they may soon become so unpopular that it will be dangerous to drive there. This tendency merely shows the general feeling among many of the ignorant foreigners towards the rich. It is not the automobile, *per se*, but the opportunity and the excuse to show their hatred of those who are able to own one, that breeds most of the mischief.

This class seems unable to comprehend that the rich car owners and drivers are usually the careful and considerate drivers. The reckless ones are in nine cases out of ten chauffeurs who have taken cars out unbeknown to their owners and who are taking a "joy ride," which is merely another term—and a poor one, by the way—for a criminal and vicious ride. It is not, however, either the rich or the poor, by themselves considered, who are responsible for accidents; it is carelessness, recklessness, and a disregard for the rights of others, and this feeling is not monopolized by either rich or poor, although justice and candor compel us to say it is usually a concomitant of ignorance. The chief cause of the trouble on the East Side in New York is that the streets are usually congested with swarms of children at play. Of course they have no business there, but if anything be said against it, up goes a howl that poor children have no other place to play, which is true—more's the pity. By far the larger portion of accidents at present result from children either crossing the street or playing in the street, and with complete disregard of all vehicular traffic of any kind. For this state of things parents are quite as much to blame as their children. But be this as it may, as long as it exists car drivers must exercise the utmost care and this cannot be done unless the average speed in such localities is much reduced.

What is happening in New York is of interest elsewhere. The automobile tough, like the street-corner hoodlum, is responsible for much of the unpopularity of the automobile and he is to be found everywhere and deserves the same drastic treatment wherever found. He creates prejudice against automobiles and brings discredit upon respectable people who own and run them.

Everyone realizes that the motor car has come to stay. That it is fast becoming an every-day utility, and, like other utilities, must be confined to its legitimate use. Respectable owners and operators are as deeply interested in that legitimate use as anyone else. Like all other people, they condemn that use which makes the automobile a menace to the public safety. As vindicating their own good citizenship they can undertake nothing more to the purpose than the suppression of automobilephobia and automobile recklessness.

Another Cranking Accident.—While cranking his car recently, a Norfolk, Va., physician had his arm broken in two places. It was the result of back kicking—the usual difficulty—and if the doctor had but grasped the crank in the right way, the back kick would have been harmless.

Ran Into a Telegraph Pole.—While taking a spin near Altoona, Pa., a car swerved and the driver attempted to apply the brake, but he inadvertently pulled the wrong lever and the car sprang forward and into a

telegraph pole with great force. No one was very much injured, but the front end of the car was demolished.

Struck a Planked Culvert.—Near Pomona, Cal., while driving in the dark, a party of three got thrown out of a car when it struck a planked culvert. One of the women occupants landed on her head and was killed.

Caught In a Wagon Rut.—While driving near Jamestown, N. Y., an automobile containing three persons ran into a ditch and threw out the passengers, injuring them all more or less. One of the front wheels of the car caught in a wagon rut, and this caused the sudden swerve to the ditch.

Hits a Tree.—While on their way from Coney Island, N. Y., recently a party was flying along without a jar or a tremor when the driver saw something in his path. He swung the wheel instantly to avoid the obstruction, and the next thing he remembers was a white-coated surgeon working over him. The car was wrecked when it came into collision with a tree. It was the wind-up of a so-called "joy ride."

Breaks a Man's Back.—In St. Louis, Mo., an automobile driven by a negro chauffeur hit a man and broke his back. The chauffeur ran but was apprehended at the point of a pistol held by a policeman. The victim is partially paralyzed. The car was going at high speed.

Caused By the Steering Gear.—While coasting down a short decline near Leicester, Mass., a big car holding six people turned abruptly and ran into a tree, throwing out and bruising the occupants and putting the car out of commission. The driver said: "It was my fault. I was coasting along at a moderate rate, when I forgot myself for a minute, and trying to turn out of the way of a board in the road, I turned too quickly and the steering gear broke, which caused the machine to swerve to the side of the road and strike the tree." Steering gears do not "break" easily, but they should be handled with common sense and judgment, and be carefully looked after before every trip, for when they are needed, like the famous border gun, they are liable to be needed badly.

Too Much Speed and a Saloon.—Two men in a big touring car stopped at a saloon near Canandaigua to inquire the way. They took in two men to show them the right road and in attempting to turn a short angle at a speed of about 50 miles an hour the car went over an embankment, turning three somersaults. Two of the party met instant death and the other two were badly injured.

Into An Open Ditch.—After driving a car into an open ditch near Pittsburg, hurling out the occupants and wrecking the machine, the chauffeur got frightened at the sight of the unconscious victims and decamped. He was subsequently arrested, accused of removing the license plates to avoid detection. The injured had broken bones and bad bruises.

A Collision In the Dark.—In St. Louis, Mo., an undertaker's black wagon, invisible in the dark, caused an automobile wreck in which one young woman was seriously injured and another woman and two men were thrown out. The collision was terrific. The sombre wagon could not be seen in the darkness and probably it was standing where it did not belong.

A Lighted Pipe.—A Philadelphia doctor who liked to tinker his car and who usually worked with his lighted pipe in his mouth, in some way allowed a spark to come in contact with the gasoline fumes and there was a terrific explosion. The car was about de-

stroyed, the garage was set on fire and the doctor was horribly burned and may be disfigured for life.

Landed In a Cellar.—While driving his car in Brooklyn, the owner claims it became unmanageable, and, seeing it was making directly for an open cellar, he jumped out. After he had picked himself up he peered into the cellar and saw his car a total wreck. The man himself received painful bruises. The fact of the matter is probably the driver got rattled and did not know just what to do when he saw the open cellar looming up before him.

Steering Gear Snapped.—Here is another case that need not have occurred if the steering gear had been handled properly. Five people, three women and two men, were riding down a hill near Norristown, Pa., recently when the steering gear of a heavy and high powered car broke. The car swerved and plunged down a six foot embankment into a stream. It was a dangerous place in the road, and quite likely the car was going at too high speed. The occupants were all more or less injured and five horses were unable to drag the car out of the creek.

AUTOMOBILES AND ACCIDENTS.

Conditions, Facts and a Matter That Needs to Be Settled.

In his comments on automobile accidents, Mr. Chalfont of the Licensed Manufacturers states several important facts and draws some pertinent conclusions, although he does not state all of the truth in every case. He says:

"From Jan. 1 to April 10, 1909, the police records show that in New York City there were 434 vehicular accidents. Of these 162 were due to street cars, 102 to wagons, and 90 to automobiles. The remaining were caused by horse-drawn trucks (53), horse-drawn cabs (12), and trains (15).

"In spite of these figures, as opposed to accidents in which an automobile is not concerned, the slightest accident in which an automobile plays a part is generally the basis of large headlines over a news story, most frequently inaccurate and often exaggerated. Here we doubtless see the effect of the comparative novelty of the mechanically driven vehicle. Run-aways and the like, of horse-drawn vehicles, are new to no one. For generations we have been accustomed to such misadventures; they are no longer 'news.' It would seem that any new transportation medium must for a time pay the penalty of being too strongly in the limelight and the burden of much criticism and doubt. Broadly it is pioneer work."

The foregoing is all quite true, but one thing should be added, namely: Automobile accidents are as a rule far more destructive and deadly than other vehicle accidents, and for the reason that the moving bodies usually travel far faster and they are far heavier than other vehicles. Mr. Chalfont goes on to say:

"It is not easy to elucidate the points inherent in the subject. To say that indignation often most naturally harbored against the automobile is the outcome of the illegal and dangerous recklessness of a very small percentage of motorists and chauffeurs; and that the best statistics procurable indicate clearly that the relative number of accidents due to automobiles is declining, instead of increasing, does not make less deplorable the repeated fatalities in New York City recently."

We regret to say that according to our own information, such accidents are not decreasing but are on the increase, although not quite in proportion to the increase in the use of the automobile. Let us be fair

and truthful, no matter what the result. Mr. Chalfont goes on to say:

"Automobile drivers have a right to a fair use of the road, and the reasonable conduct of pedestrians thereon. As a matter of fact the motorist probably 'gets it both ways' in the conditions upon which the principles are based. It has become an axiom that an automobile driver should for his own protection constantly assume that persons on or near the road will do the very worst thing possible for their safety; and it is surprising how often this assumption 'comes true.' It is bad doctrine that the public streets and highways should be used for children as playgrounds; yet they are, and will doubtless continue to be so used; the middle of the street is the favorite and the only playground available for many thousands of children in New York City, especially in the Borough of Manhattan."

The foregoing is timely and true with the single exception that neither the streets nor the highways can continue to be used conjointly by children as playgrounds and for automobile traffic; one must finally give way to the other. If the children are to be allowed their unlawful use then some other place of travel must be provided for automobiles, and the sooner this matter is settled, the better. To say that the streets are the only playgrounds that thousands of children have is begging the question. They have no right by law to play in the streets and it should be stopped.

A Super-Sensitive Official.

The Federal Government has added one to the list of troubles which, according to the advocates of air cooling, are an accompaniment of the cooling of an automobile engine by means of water. As water will freeze while air will not, freezing troubles are found only with water-cooled engines, which fact causes the use of an "anti-freezing solution." With an air-cooled motor car the engine is "anti-freezing." Now the Commissioner of Internal Revenue at Washington has started to give his attention to water cooling, and has given a decision that automobile dealers preparing "non-freezing mixture" for their customers must pay a special government tax if the product contains thirty per cent. or more of alcohol. Wood alcohol is the kind commonly used, but the commissioner is apprehensive that under the guise of a "non-freezing solution" some new kind of intoxicating drink will be distributed in prohibition states either in bulk or by passing automobilists.

New Jersey Laws.

New Jersey has a number of new automobile laws, the principal one of which does away with the drastic law of last year, which kept thousands of automobilists out of the State. The new law permits non-residents to go into New Jersey for eight consecutive days or four periods of two days each in any year for \$1 and even this restriction should also be wiped out. Non-resident motorists, licensed in their own States, need not take out drivers' licenses. The law does away with the requirements of numbers on front lamps at night; fixes twenty-five miles an hour as the maximum speed limit in open country, where the houses are on an average more than one hundred feet apart, and reduces the fees allowed justices of the peace, constables and witnesses to such a low figure that there will be no incentive for making wholesale arrests; also throws costs upon the complainant in case the judgment is reversed upon appeal.

THE REPAIR SHOP

REPAIR TOOLS.

Something About the Kinds, the Quality and How to Use Them.

BY JAMES F. HOBART, M. E.

Don't try to see how many tools you can get into your repair kit, but do try to see how good ones you can obtain. There is something about a good tool which gives its owner more satisfaction than almost any similar outlay. When you purchase a tool, never decide in favor of the cheap one, and never buy a tool you don't want because it is cheap. The writer has a peculiar custom in regard to the purchase of tools. Almost everybody has, in some manner or other, become addicted to, or sometimes followed the souvenir habit. And once this habit gets hold of a man, it is very hard to get away from it. The writer found this out years ago, and it turned to his benefit in the following manner:

When the souvenir fever begins an attack in any particular locality, do not let it run to old clocks or furniture, or play programs or 100-year-old cracked china! Just hie yourself to the hardware store when suffering from a particularly aggravating attack of souveniritis—an attack which cannot be overcome by the postal card treatment—just visit the hardware store and select a souvenir worth keeping in the shape of one good tool. It will form a pleasing remembrance of the place where it was obtained and it will also have the advantage of always being useful.

But when a man has to obtain a brand-new repair outfit for road use, what shall he do? The answer usually is: Take everybody's advice and then do as you bally please! It is mighty hard to please everybody in these matters, and in nine times out of ten, a fellow don't please even himself after he has had his own way! But that's the best way to do; try to please yourself if possible.

But about selecting that repair kit, we will see about using the tools as we come to them. First, obtain some form of containing device to keep and carry the tools in. The boiler maker keeps his in a nail-keg, but that is no reason why the autoist should do so. Almost any form of grip, or ordinary traveling bag will answer the purpose, but the writer is dead set against any form of common receptacle for tools for use on the road. While in the garage, it will do well enough to keep the tools in a box, but on the road, I, for one, do not want anything aboard which can possibly rattle.

The auto driver has enough to do in keeping his ears tuned up to detect new rattles as they develop in the machinery. A rattle to him is a warning of more serious things to come unless the rattle is promptly heeded and its cause found and removed. Therefore, it is not desirable to have a lot of loose tools in a bag and able to organize a rattlefest at any moment just for the fun of it. None of this for me. I want a good roll tool-holder which will pinch each tool closely when rolled up, so closely that there can be no rattle whatever. The leather roll is preferred by some, but give me a stout canvas affair, or better yet, one made of netting like a hammock. This roll, with leather outside for the first fold, makes a fine tool-holder.

Now for the tools: First come the hammers. This

is the most important tool. Two ball-pene hammers should be selected, one light, the other heavy—about like a smith's forging hammer. Also, I like to have a small hatchet-pene hammer along, a regular square body riveting hammer, weighing about three-quarters of a pound. This can be cut out if desired, but I had rather dispense with the light ball-pene machinist's hammer if the outfit must be limited to two. Next in importance to the hammer comes the wrench, with the cold chisel a close second. As regards wrenches, I am inclined to be very liberal with them and regard twelve (12) as the proper number to be carried in a road kit for a high-powered car. I would divide up the wrenches as follows:

Three "monkey" wrenches, 6-inch, 12-inch and 18-inch, or 6-inch, 10-inch and 14-inch, if the car is a small one. Next, select two "Stilson" wrenches, one

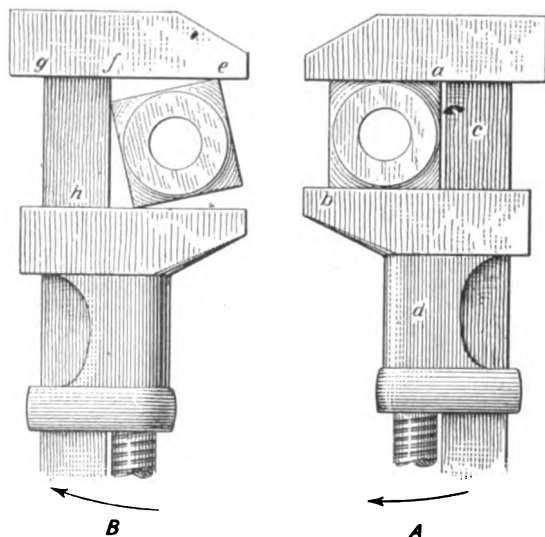


Fig 1. Right and Wrong Wrench Methods.

8-inch, the other 16-inch or 20-inch, according to the car. Add a set of solid-end wrenches. These are the most useful of all the wrenches and a "set" usually consists of five, each double-end, thereby providing ten different sizes which will fit about every bolt in the car. These wrenches are frequently called "S" wrenches, but a solid end wrench may be either straight or "S" as desired. In any case, it is a solid-end wrench.

Some auto-drivers add two adjustable "S" wrenches to the outfit. These are very handy tools in certain cases, but they are not very strong and have the disadvantage of being quite thick at the end which engages the nut. These are good things to add as souvenirs. There is one form of wrench which is frequently found in repair kits which I have not mentioned. I allude to the "Alligator" wrench. That variety has not been included in the tool list, and it never will be as long as the writer has his say about the selection of tools. It is a very handy tool in many instances, but it is also the most diabolical invention of the age to deface the surfaces to which it may be applied. It will cut the corners off nuts and bolt heads, chew the plating off oil-cups and fittings; in fact, like the alligator itself, it will take a bite out of anything and everything which is placed between its jaws. When I find an alligator

wrench in the kit of one of my men, be he machinist, garageman or chauffeur, he is warned never to use that tool upon any of the property over which I have control. If afterwards, the man is found using that tool, it is taken from his hands and thrown into street or sewer. The next time the man commits alligatorism, he is given his time and sent after the wrench.

In regard to using wrenches, the solid-end tool needs little instruction with it. All that is necessary is to get a good hold of the nut and then pull. When using a Stilson wrench on a nut, the only safe rule is to lay down the Stilson and get a wrench fitted for and made for square and hexagonal nuts. The Stilson wrench is intended for round shapes and it should be kept for them. The monkey wrenches need a little instruction, or their user needs it. Referring to Fig. 1, sketch A, shows the proper method of applying a monkey wrench for tightening a nut. Observe that the movable jaw has been screwed back just far enough to span the nut. There is no lost motion between nut and wrench, nor should there be any. When the pull comes upon the wrench in the direction of the arrow, the strain comes upon the wrench at a, and at b. The strain at a is carried easily by c, which is almost in line with strain a. The strain at b is easily absorbed and carried by the brace d, which effectually backs up the sliding jaw b.

When the wrench is improperly applied as shown by sketch B, Fig. 1, several undesirable things may happen. First, the wrench-jaws are so far apart that the strain comes on the extreme corners of the nut which are defaced thereby and soon rounded too badly for use. Next, the strain comes against the fixed jaw at e, and this gives a long leverage, e f, to be sustained by the short leverage, f g, which is insufficient, and was not designed for that purpose. Therefore, the average wrench becomes "sprung" at f, and sometimes bent at h. Put the wrench upon the nut so the strain will always come against the heel of the fixed jaw and the toe of the movable jaw, and there will never be any strained or bent monkey wrenches.

When selecting the cold chisels and the punches, be liberal and you'll not be sorry. Four cold chisels, from $\frac{3}{8}$ -inch up, should be carried, and they should always be kept in the condition shown by Fig. 2. It goes without saying, that the business end of a cold chisel should always be kept well sharpened, and the chisels should be ground whenever they become the least dulled. But the other end of a chisel is usually left to its own devices. When we hit a steel tool with a hammer, the invariable result is to spread or "broom-up" the end which receives the hammer blows. This end of the tool must necessarily be left soft in order to protect the hammer. Therefore, by long-continued hammering, a "head" is gradually riveted upon the hammered end of cold chisels and punches. The remedy is to grind the head of each tool as shown at a, Fig. 2. This keeps the chisel or punch always in the pink of condition.

The punches should run by thirty-seconds of an inch, from 1-16-inch to $\frac{1}{4}$ -inch, and there should be a couple of center punches included in the bunch. At least a half a dozen files should be carried. An 8-inch "rat-tail" file should be included in the list, also a coarse half-round file about 10 inches long. A three-cornered file is very useful, and two good mill-files 12 inches long should be included, also one very fine cut file known as "dead smooth" cut. I prefer this to be of the half-round variety for the reason that it gives two varieties of file in one. A little knife file about 5 inches long is a valuable addition to the kit, and a

"Plumber's Pliers" should be added. These are something like gas pliers, but by turning them until the jaws are fully opened, the rivet will slip into another hole and the pliers will grasp an object nearly 1 inch in diameter. One pair of cut-nippers should always be included in the auto-kit, and the particular variety marked "P. S. & M." finds great favor with most autoists.

Some drills are a necessity. For the smaller sizes, carry a spiral drill with eight bits in the handle, ranging from $\frac{1}{8}$ -inch down to 1-32-inch. The larger sizes should be "twist drill bits" and an ordinary carpenter's brace may be used to work them, or a breast drill stock may be used. The brace is the less bulky. A small hacksaw frame and saws is a boon in some cases, and the screwdriver must not be forgotten. Some people carry an automatic device with three interchangeable bits, but for field work I prefer a plain handle with the three sizes of bits.

One of the handiest things which was ever added to a repair kit is an ordinary gasoline torch as used by plumbers. This tool will not pack in the tool roll, but a place is easily found for it. Gasoline is always to be had, and if a soldering copper be added to the roll, with some solder and a little resin or soldering powder, the gasoline tank may spring a leak and be soldered at will. And here is a new one for the autoist. Select some of the incandescent mantles which are mounted between double wires surmounting a collar.



Fig. 2. Care of Cold Chisels and Punches.

Select a size, or adapt any size, to fit the barrel of the torch. Then, slide a mantle over the end of the perforated blow-torch barrel, fix it there by means of the collar, start up the torch and you have the finest light ever put out by a Welsbach mantle. It can be used for lighting up repairs, or for reading during enforced night delays. Of course the mantle will have to be thrown away when the auto moves on again, but when the autoist wants light, he doesn't mind a 15-cent mantle for getting a good light in a portable form.

When fitting the tools into the roll tool-holder, be sure not to forget some lime bags. Little bags of any cloth which will hold flour may be made 1 inch or so in diameter and with a length equal to the width of the tool-roll. Put these bags inside the roll, crosswise, and fasten on some wire-cloth pockets to hold the bags in place. Put some bits of crushed quicklime in the bags, tie them up and slip them one into each of the pockets. The tools will not rust as long as any unslaked lime remains in the pockets, which may be easily emptied and renewed when the lime is all reduced to powder. This arrangement will not work with air-slaked lime, or with commercial hydrated lime. Pieces of unslaked quicklime (Calcium oxide) must be used. This substance will gobble up every bit of moisture which comes near it. It takes the moisture right out of the air, or off tools, so greedy is the lime for water.

In addition to the above named tools, do not forget a good oil-stone and a first-class pocket knife, together with a rule. Some people advocate the carrying of a small bench vise, and sometimes this certainly is a great convenience. And one thing more—Never, NEVER use a monkey wrench for a hammer. Carry a bit of copper, or lead, or raw-hide for protecting finished surfaces when it is necessary to hammer or drive them.

SHOCK ABSORBERS.

The Use of Rubber to Arrest Shock and the Recoil.

BY J. L. H. MOSIER

Since the advent of elliptic springs to wheeled vehicles, the question of an application to arrest the recoil of the springs when meeting with obstacles in or on the roadway, sometimes termed shock, has been one of moment, coming to the front to-day, then retiring to a remote back seat for an indefinite period as though to recuperate and gain strength to rebegin the futile attack. The writer in his nearly sixty years at vehicle building has seen many devices tried. The one which was most effective was a leathern strap from each side of the body to the reach or perch or to the axles, front and back. This device prevailed from before the writer's memory until about 1870, at which time the prevalence of the half spring buggy, on which the same was of little value, caused them to fade away and by 1872 they were about obsolete.

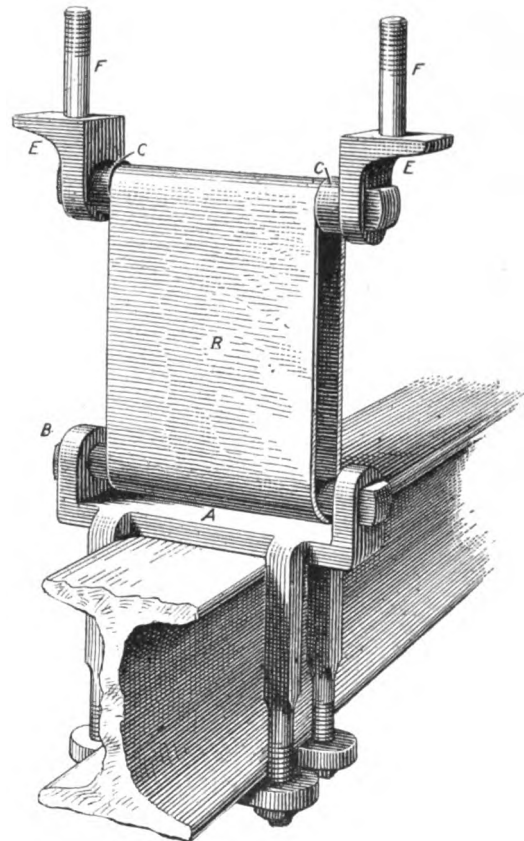
It is to be expected, if we meet with an obstacle on the road with the vehicle moving at the rate of twenty or more miles per hour, the shock and its first result, recoil, will be greater than if moving at from five miles per hour to eight miles per hour. Then another important factor to be considered is, that the lifting or jarring of a wheel three feet in diameter will produce a greater shock and consequently a greater amount of recoil than if the wheel is four feet in diameter. This simply illustrates the difference between the self propelled vehicle and the horse or animal drawn vehicle.

The advent of the self propelled vehicle and its prolific growth, coupled with an increasing popularity, has again brought the shock and recoil matter into discussion. To overcome the matter complained of a number of shock absorbers, as some are pleased to term them, have been put forward to claim the prize. All aim at the same effect and insofar as we know, are of metallic construction. While to all intents and purposes they apparently act on receipt of shock, those we have seen do not let go soon enough to be of value. In cases of severe shock some of them become absolutely vertical and locked in that position, making riding unpleasant until they are set loose with or by a blow of a hammer. Again, being made of metallic steel or iron, they readily absorb or accumulate moistures and mud from the roadway. Oxidization sets in and in a very brief period ends their practical usefulness. The writer at his present place of employment has seen them removed and upon examination has found them locked solid with iron rust. Any method of lubrication was not noticeable.

Yet, after going over the situation seriously and carefully, a decision has been reached that a recoil arrester is an absolute necessity. An arrester which will act instantaneously in arresting the recoil and in letting go. It must be an agent requiring no lubrication, an agent that is impervious to normal atmospheric influences, rain, snow, atmospheric or natural heat in its various graduations from zero to blood heat, or from 0 degree to 100 degrees. The only agent which will fill the bill is rubber, as is set forth by the accompanying drawings and description.

The general design for an arrester in which rubber is employed is shown in Fig. 1. The clip A is secured to the axle on its upper surface just enough inside of the spring to permit of proper manipulation. The arrester proper, which in plain English is an endless band of rubber, R, passed at the bottom around the bolt B, held in the ears of the clip, A, and at the top

around a metallic tube held between two ears, E, E, which are secured by any convenient means to the under side of the chassis. The tube may have two collars, C C, to prevent the rubber coming in contact with the ears at top or bottom. The exact dimensions of such a device may not be definitely set forth from the fact that an arrester which would answer for a six horse power runabout would not be adequate for a 50 horse touring car. The chief feature to be understood is that the arrester or shock absorber must be strong enough to be fairly tight when the car is freighted with its normal carrying load. It must be elastic enough to yield at a shock and yet strong enough to prevent recoil and will better fill its pur-



A Novel Shock Absorber.

pose if made of fairly hard rubber. It will be well to apply talc powder to the rubber where it bears on the brass tube. To keep the arrester in good shape change its bearings on the tube occasionally. The length of the arrester band may be taken up by placing additional thicknesses of brass about the tube at the top, or the bolt at the bottom, or by an adjustment arranged upon the bolts F F. By using the above it will be found the breaking of springs by recoil will be greatly reduced.

Many an apparently serious breakdown occurs simply from the fact that the operator fails to examine the condition of the batteries or the state of the spark plugs or commutator before starting on a trip. These details, being very simple and requiring only a few minutes' work, should never be neglected.

According to Henry Souther, the motor car expert, the car of the future will be light, weighing only about 2,000 pounds, operated by valveless motor and having sufficient tongue to eliminate the use of transmission gears.

VARNISH DIFFICULTIES.

Sweating, Deadening, Pitting, Enameling, Crawling, Wrinkling and Other Points.

BY M. C. HILICK.

The sweating out of varnish is not confined entirely to any particular season of the year, although naturally it is more prevalent during the spring and summer months than at other seasons. The main cause of the sweating out varnish is rubbing the surface before it has sufficiently hardened. When the conditions are poor for the drying of varnish, unless the material is given an extra time allowance for drying, sweating is likely to ensue upon the surface after rubbing. When the varnish is rubbed and permitted to stand over night in a paint or varnish room atmosphere, foul and fetid from the day's activities, it will take on a greasy scum unfit to varnish upon without again lightly rubbing the surface. As a matter of fact, the surface should receive a light rubbing to remove the accumulations always just prior to varnishing. This simple item of prevention is worth many larger items of cure. The surface, however, that sweats out after rubbing as a result of insufficiently hardened varnish, must be allowed to harden thoroughly and then given another thorough rubbing. This matter of varnish sweating should be carefully watched during the next few months.

When the finishing coat of varnish loses its lustre, or "deadens," or "flattens," as it is variously called, caused by unseasoned lumber, or undried under coats, or by excessively porous coats, it will be necessary to let the coat harden enough to allow a light rubbing with rotten stone and water after which re-flow the surface. This is another difficulty which should be guarded against, especially during May, June, July, August and September.

The motor car varnisher is probably no stranger to "pitting," a form of trouble which converts the varnish film into an expanse of minute pits. Many carriage painters call the trouble pin-holing, although pitting is actually an aggravated form of the former. Pitting comes, or may come, from mixing varnish of different grades or makes, varnishing over a sweaty surface, or one not sufficiently dry, or from a change of atmosphere, such as warm to cold, or from dry to moist, during the critical stage of the drying process. Draughts of air will cause pitting. An unripe varnish will pit oftentimes under the most favorable conditions.

The silking and enameling of varnish is a particularly hot weather difficulty, a product more especially, we might say, of the hot, moist days when collars wilt and perspiration comes without exercise. Some varnishes may be made to enamel through excessive brushing, but chiefly the trouble arises from dog-day conditions. Dissipating the moisture by starting a fire in the shop stove, or bringing heat through steam pipes, will serve usually to prevent the development of enameling. While it is undesirable, even if possible, to eliminate all moisture from the air, a little dry heat turned into the varnishing apartment will succeed in counteracting the effects of the superabundance of hot moisture present.

Seedy or specky varnish comes from a dirty varnish, or an unripe one, or one chilled perhaps during shipment. The varnish open to the air sufficiently to cause "skinning over," this skin then crumbling into atoms, will look seedy when applied to the surface. A dirty varnish will also cause the surface to look "specky." The cure for this trouble may be summed up thusly: Do not let the varnish supply become

chilled. Use a reliable make of varnish. Apply the varnish in a warm, dry room in a temperature not less than 68 degrees. Use clean brushes, wear clean clothes and be clean. An egg-shell gloss varnished over in a temperature under 65 degrees, will cause the varnish to crawl—not always, but usually.

Soapy or fatty substances, or greasy hands wiped over the surface, are causes of varnish crawling. Varnish applied over a color, or a color-varnish ground, with a so-called egg-shell gloss, is likely to crawl. Remedy: Wash the surface with clean water, dry off with a chamois skin and apply the varnish at once.

An unripe varnish will wrinkle many times under the best working conditions. Moving a varnish during the process of drying from a warm room to one evenly slightly cooler invites wrinkling. This trouble may come, too, from applying a too heavy flow of varnish.

Use of Black Enamel.

For the rusting of parts beneath the hood, black enameling may be used with good results both from the points of view of effectiveness and appearance. It is quite possible to get a black enamel nowadays, which looks and wears very little inferior to a baked enamel. The ordinary enamels, which dry quickly, are of little use, as the surface soon chips and rubs off. Parts to be enamelled should, when possible, be taken off and all rust cleaned off with a stiff brush, a wire brush for preference. To apply the enamel a fairly stiff varnish brush should be used. The main disadvantage in applying a good lasting enamel is the time it takes to dry hard—it may require a whole week before the part could be handled. It is quite possible to enamel certain parts in position by the aid of a brush of suitable size, of course taking great care to have the part thoroughly clean and free from rust and grit to begin with. The work must be done in a good light, preferably daylight, otherwise one will find places here and there that have been missed by the brush, and this looks careless and amateurish. Another detail to be kept in mind is to do the work in a clean atmosphere; there must be no dust blowing about, otherwise the surface will be spoiled. The parts that may be enamelled with advantage include steel fan blades, pulley arms, brackets and elbows, nuts that do not require to be disturbed often, exposed pieces of shaft, pinion wheel centers, operating rods, collars, etc. Even a cylinder casting or set of castings could be treated, as a good enamel will stand the heat without blistering. Of course, it would be no use attempting to enamel the exhaust pipe. It is, in fact, difficult to do anything to it beyond blackleading it frequently.

If a rim is noticed to have the paint knocked off in places when the cover is removed, take the opportunity of applying Brunswick black to prevent rust forming.

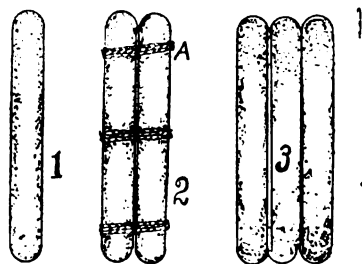
Every owner should possess a plan of his wiring system, and carry it on his car. If one is not supplied by the makers, he should draw out one himself.

Don't use engine oil to lubricate spring shackles, brake parts, etc.; a much thinner oil will give better results.

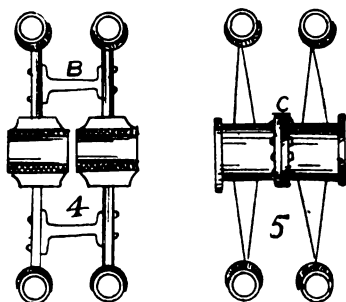
Wash out cuts in cover with benzine, not gasoline, before applying filling compound.

EXTRA WHEELS.**A Peculiar Expedient Adopted to Gain Strength and Prevent Skidding.**

While it is not at all technically correct from a mechanical point of view to add one or more wheels to the wheels already in use on a motor vehicle, repairmen have been called upon to do so. You may see motor vehicles of various designs in use in the cities and towns fitted with an additional wheel alongside of the regular or fixed wheels. The object of the added

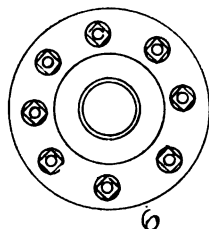


wheel is to gain strength and resisting power. Ordinarily the extra wheels are put on automobiles which are required for unusually heavy service. Sometimes an extra wheel or two are added to the driving wheels to aid in getting a grip on the road. Then, again, the wheels are added so as to afford a better support for the vehicle. The manner of establishing the addi-



tional wheels is often quite cumbersome. If the extra wheels are put on by using an extended bearing to the axle, much better results are obtained than when the added wheels are secured by bolts, wires or cords to wheels already in position.

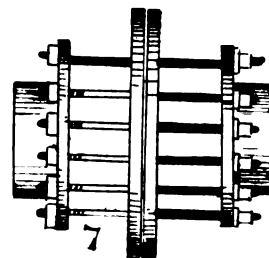
The cuts will assist in explaining the modes of joining the added wheels to the fixed wheels. Fig. 1 illus-



trates the single wheel. Fig. 2 shows a crude manner of attaching another wheel to the first wheel, involving wrapping with rope. The rope A is going to wear off soon. It will catch and drag. Yet I observed a case in which one wheel was bound to the other by a system of cords. Three wheels are known to have thus been used, side by side, as in Fig. 3.

In joining, the first essential is to select wheels of equal diameter. Then a new axle should be made. There are various schemes to attach the extra wheel independent of the axle, but most of them are defective. However, if the longer axle with the extended bearing

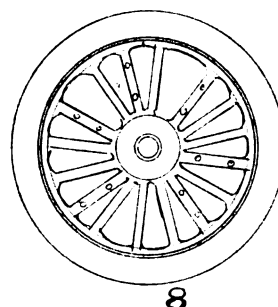
cannot be obtained, the jointing method shown in Fig. 4 can be adopted. This involves the employment of four clamps inserted as at B. These clamps should be made from iron. They can be forged quite easily and bored and tapped for the setscrews. The setscrews



pass through holes drilled in the spokes at proper intervals.

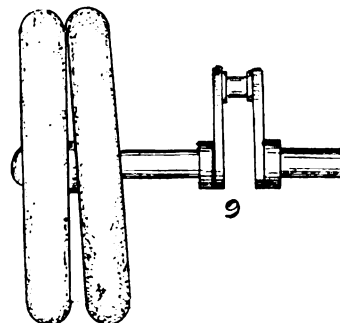
Another mode of joining two wheels is shown in Fig. 5, in which the flanged hub system is utilized as at C. The flanges are bored for receiving the series of bolts. The bolts are tightened securely and the flanged hubs of the wheels are supported firmly.

A type of flanged hub for this service is shown in Fig. 6. Another system of joining one wheel with an-



other side by side is shown in Fig. 7 in which a number of bolts are used in connection with flanges. Sometimes one wheel is fastened to the other merely by boring holes through the spokes as in Fig. 8. Then when the extra wheel is adjusted beside the fixed wheel, the bolts are passed through the holes in the spokes of both wheels and the nuts are tightened. A double system of nuts is needed, with the nuts on each side of each system of spokes, so as to tighten up on the individual spokes. Often the additional wheel is established incorrectly.

The wheel frequently gets out of line and tilts as in Fig. 9. In case that the work is required to be correct, which it always should be, the straight extended axle should be employed. Then the connecting and



clamping with cords, wires, bolts, etc., can be dispensed with. The two hubs of the two wheels fit on the extenuated bearing of the axle and the weight is evenly distributed and there is no danger of the one wheel getting out of alignment with the other wheel.

Spoiled by Bad Oil.

An expert on the use of lubricating oils says that during his years of experience in the automobile trade he has seen many automobiles ruined by the use of poor oils and owners and dealers have often condemned the manufacturer, when, as a matter of fact, the fault is purely poor lubricating oil. The purpose of lubricating oil is to reduce friction, and to the extent you are able to reduce this friction you save power and prolong the life of your car. The after effect of poor lubrication is a worn out car. Few owners exercise the proper care in the selection of oil, often buying the cheapest oil obtainable, while many dealers do not give this enough consideration. The owner of an automobile may be fooled the first time or two, but you can not fool the motor, as the effects are the loss of power and the repair bill. An owner should select a good lubricating oil—one that will never go back on him. He will note the satisfactory results at once, less carbon and greater lubricating qualities. From 20 to 35 per cent. of the power between engine and drive wheel is lost by poor lubrication. "Quality counts" is an old saying, and its truth was never better demonstrated than it is in the lubrication of a motor car. It is not how much oil you feed that counts. Success of lubrication depends on quality, not quantity. Some time ago the owner of a well-known make of car, which contains a very sensitive motor, came to the conclusion that his car, while it seemed to be all right, was not giving him that entire satisfaction that he thought should be received from a car of that kind. A change of oil was suggested. After cleaning the car thoroughly this owner tried a reliable oil, and a few weeks afterward stated that until he had tried it would not believe that change of oil would make so much difference in the running of a motor as this change had done for him. Often the owner of a car will complain of cut bearings when his lubricator has never failed to work and his crank case has always had sufficient oil to keep the bearings from becoming dry, when the fact of the matter is that his oil has been carbonizing, and these small flakes of hard carbon have been dropping into the crank case and minute particles work their way into the bearings and grind them out as quickly as if emery had been placed in the crank case. While, as stated before, all oils contain carbon, yet if the oil is of the right quality and has been refined scientifically this carbon will burn with a perfectly dry ash, which will discharge itself through the muffler and no bad results will be obtained from its use.

Spark Plugs.

If a spark plug becomes defective or worn, throw it away rather than attempt to repair it. Plugs are now so cheap (because they are made in such large quantities on automatic machinery) that it does not pay to bother with repairing them. Yet it is well to note that the best material for sparking plug electrodes is platinum, because of its high fusing point. It is expensive, and, therefore, rarely used. Nickel is largely used, but a twenty-point nickel steel is used on most of the plugs.

Although a new battery shows up properly on the voltmeter, don't be too certain that it does not require recharging unless the reading is taken with the battery at work.

Ball bearings require little oil, but they should on no account be overlooked altogether.

Large Tires and Small.

There is much to learn in connection with tires. Tire equipment is a problem keeping many men busy in inventive effort. Lightness and resiliency are wanted, with toughness and durability. The first qualities call for thin tires of pure rubber and the last for thick tires of a better wearing composition. The virtue of the pneumatic is that it takes up the shock at the initial point, saving every part of the vehicle, including wheels and axles. The ideal tire would be just the circlet of compressed air around the rim that is within the tire and no covering for it. That being impossible, the next best is the compressed air with a covering as thin as paper, but that being impracticable the rubber tube and shoe are necessary to stand the strain and wear and protect the air which is the real cushion of the car. It is by reasoning from these first principles that the users are learning the value of larger air chambers and proper inflation.

According to E. L. Ferguson, the first automobile tires that were made of the size 36x5 inches were produced at the expense of the owner, he paying for the mould. At that time tires of the above size were not made, and were looked upon by tiremakers as excessive in size, even for the big car for which they were ordered. The man wanting them, however, never regretted the cost, as the saving in the first two years of both money and temper yielded what he considered big returns. The principles of reasoning that brought about his idea of size came from the fact that he took a bicycle tire of that day and considered its cubic air capacity as compared with the weight it carried. Ignoring for a moment the fact that the automobile tire had greater strains from speed and from the twisting action of four wheels, as against two, he found that the tire sizes then recommended did not carry a proportional volume of air, and it was this point that started him along the line of ordering and paying for the bigger tires.

Cause of An Explosion.

Explosions are of frequent occurrence in Wall street, but they are usually of mind and not matter. The other day there was one that caused as much commotion for a few minutes as a new Black Friday, and the result was as follows: A fine big car whose bonnet, mudguards and front glass were covered with a yellowish red stain, whose radiation cap was torn off at one side and very badly bent, a chauffeur more scared than hurt and thoroughly disgusted. A glance told the whole story. An accumulation of rust and sediment had clogged the overflow pipe, a pressure of steam had been generated in the cooling system as the motor was kept running when the car stood still and something had to "give." The cap was the "point of least resistance" and off it went and a geyser of hot water and rust shot up into the air to shower the front of the car. Moral: Keep the vent pipe open.

Evils of Carbonization.

Carbon in piston heads and in the combustion spaces of gasoline motors is almost inevitable after extensive service. As with most other evils which afflict gasoline motors, methods of prevention and of cure are both desirable of application. The avoidance of too much or imperfectly gasified fuel mixtures and the employment of a most excessive quantity of a grade of lubricating oil which is as free as possible from a tendency to produce solid residue are preventives.

Sensible Don'ts.

A little book is about to be issued that novices and all others who have anything to do with the running or care of a car will find pleasure and instruction in reading and fixing upon the memory. It is called "Sensible Don'ts," and although it has been copyrighted, permission has been given this magazine to quote the following from its pages as an example of its character:

"Don't permit any old ignition wire (cable) to be used in wiring your engine. Examine each piece of cable carefully and see if there is a break at any of the sharp ends. Rubber cable is best because it will reveal cracks caused by age. Examine whether the cable is firmly attached to the coil, timer, batteries, switches and plugs. See that all terminals and connections are brightened with emery paper or scraped to remove any foreign substance.

"Don't test dry batteries with a volt meter or you will burn them out. The ammeter is for testing dry cells and the volt meter for storage batteries.

"Don't think that : The more juice turned on, the better and faster the car will run.

"Don't go on a trip before you have tested your storage batteries. Each cell should receive an individual test. A freshly charged cell should register 2.25 volts on open circuit or from 2.10 to 2.15 volts when working on a coil. As soon as the charge falls to 1.80 the batteries should be recharged. Charge your batteries frequently and by the slow process.

"Don't start to crank your engine until you know the switch plug is in place, the gasoline turned on and the switch in contact.

"Don't crank your engine with the spark advanced. Hundreds of arms are broken yearly through this mistake.

"Don't get frightened at an explosion in the muffler. It indicates weak batteries, lack of gasoline, poorly adjusted coil or stopped-up carburetter.

"Don't let your motor pound. On hills this is generally due to spark lever being too far advanced. If retarding lever does not remedy the fault it may be in loose crank bearing, loose piston bearings, loose main bearings, or loose flywheel. Pounding can do great injury to a motor in a very few minutes and should be remedied at once.

"Don't start your car with clutch engaged. Many accidents are traced to this cause."

The book is being published by the Emil Grossman Co., 232 West 58th Street, New York, and a copy will be sent free to anyone who will write for it, mentioning the AUTOMOBILE DEALER AND REPAIRER.

Care of Casings.

A casing which is not in use must be kept carefully away from light and heat. It is preferable to keep it in a place as cool as possible and obscure, if not totally dark. This place must be cool, without being damp, as dampness is bad for rubber casings, even for those which are being used, although they are far less sensitive to light and heat than tires which are kept in one place. Spare shoes should never be permitted to lie on the ground or on a cement floor, but should be protected by a curtain of boards or straw and must be carefully kept away from any fat substance. Casings in use require more care, as deteriorating causes are more numerous for them. The shoe is constantly receiving numerous small cuts from its contact with the ground. These are sometimes almost invisible and others large enough for the driver to see, but usually so small as to be neglected. These cuts, apparently unimportant, open the door to dampness and foreign

bodies which are certain to injure the tire. Dampness rots the lining and invites blow-outs. Blow-outs are also caused by dust being forced through a slight cut in the tire or by the entrance of small particles of ground, which becomes bunched together beneath the outer rubber. The result is the accumulation of a hard body which cuts first one ply of fabric, then another, then a third, until the casing explodes.

Acetylene Lamps.

Unless the generator is kept clean, acetylene lamps are sure to give trouble. It does not matter, provided the container is air and gastight, how long the carbide remains therein, provided it is not used. But if the lamp has been used on at least two occasions (and few will light more than twice on one charge) the generator should be cleaned out. Unless this is done the dust will clog the gas outlet, and perhaps the water valve as well, and, worst of all, the carbide residue will eat through the brass of the container. On dismantling the generator turn the residue into an old sieve, so saving the unused carbide, and, having gently knocked away from the container all the residue possible, plunge the detachable parts of the generator, including the container, into a bucket of water. They may be left for half an hour, when if attacked with a stiff brush the deposit may be easily removed.

Double Ignition.

Many cars are now fitted with double ignition—mostly high-tension coil and accumulator and high-tension magneto—and the power obtained with two sparks is considerably greater than when only one spark is employed. Provided both sparks in each cylinder occur at the same time, it appears a good plan always to run with both sets of ignition on. In addition to the increased power, this ensures that each set is in working order. The only trouble is to ascertain that the sparks are synchronous. This can easily be done by turning the engine with the plugs from one of the cylinders taken out, but connected up and earthed on the cylinder cover or some part which is in metallic contact with it. Then advance the commutator lever until the spark in the coil plug occurs at the same time as in the one fired by the magneto, mark the position on the ignition quadrant, and then, after starting up with the coil ignition retarded, the magneto can be switched on, and then the coil firing advanced to the position previously marked, when the two ignitions must take place at the same time.

Use of the Horn.

Motor cars are becoming so common nowadays that many a hardened pedestrian does not instinctively look around when he hears a horn. He trusts to his ear and the sense of distance conveyed thereto by the purr of the engines and gears. This sense of distance is also further impaired by the great variety of horns in use; some of the electric horns in particular give little more accurate an idea of distance than a siren at sea. When the pedestrian is in error about distance the great essential is to warn him without startling him, and the fact that the best horn always startles when blown at close quarters makes the driving of a really silent car in traffic rather nerve-shattering work. A reader says he has been trying a return to the large silver-toned gongs employed on a steam car years ago, and can thoroughly recommend them for use as an alternative to the horn on all cars which are truly silent on their top gear. The appeal of a gong is sweet and coaxing to startled nerves, whereas the "grunt" of a horn is almost imperative.

TRouble DEPARTMENT.

Questions answered by the Y. M. C. A. Automobile School, 322 West 57th St., New York.

This department is intended to be a "trouble clearing house," and it will be esteemed a favor if our readers will add information to it from their own experience or knowledge.

Pneumatic and Hard Tires.

From George Kiltz, Illinois.—I wish to say something about hard and pneumatic tires. I have a car with 28-inch wheels. The rear wheels have hard tires—3-inch—which cost \$42.50 each at the time of purchase, although I don't know what they would cost at present. The front wheels have pneumatic tires of 3 inches, and one of them was put on about the same time of the rear tires. These front tires can be bought for \$15.75 each, casing and inner tube. Now the hard tires are getting the worse for wear, while the pneumatics are in pretty good shape and will outwear the hard tires. The trouble with the hard tires is that they will cut all to pieces by striking sharp stones. I have seen high wheels with hard tires all cut off to the edge of the channel in a very short time. On our gravel roads here hard tires will not last long. I have seen a good many buggies with hard tires all cut off, and it is much harder on an automobile with high wheels, for they have too light tires.

Now about the easy riding of both hard and pneumatic tires, there is a very wide difference between them, although I have heard it said that there is not much difference. I have had time and again the pneumatic tire on my car strike a stone the size of my fist and the shock would be very light, and then the hind wheel with the hard tire would strike the same stone and I would get such a reminder that I would not forget it very soon. I see nothing now that will take the place of the pneumatic tire. The greatest trouble in my experience with the pneumatic tire has been with the inner tube, which should always be of the best quality. No matter if the outer casing be ever so good it will not help the inner tube. The hard tire will dent but little when it hits a hard substance, while the pneumatic tire will dent clear to the fellow.

(Note by the Editor.—Our correspondent fails to mention one other advantage of pneumatic tires over hard tires, that may not be noticeable, but yet is important. If he were to make a test he would find that it requires more power to carry a car with hard tires than with pneumatic tires, although this is increased according to the speed that the car is driven. In the case of heavy trucks and on smooth streets the hard tire will run nearly as easily as the pneumatic, but at high speed and on rough roads, the pneumatic is propelled much easier.)

A Cylinder Misses Fire.

Question:—I have received considerable aid from your journal and would like to ask you for some information. I have a 16-horse-power air cooled motor which is inclined to miss fire in the rear cylinder. I have tried different plugs and can find no trouble in the wires, the coil points are clean. The engine is just from the factory and should be perfect so far as rings, cylinder, carburetter, etc., are concerned. (Battery good.) Can you give me an idea where my trouble is?

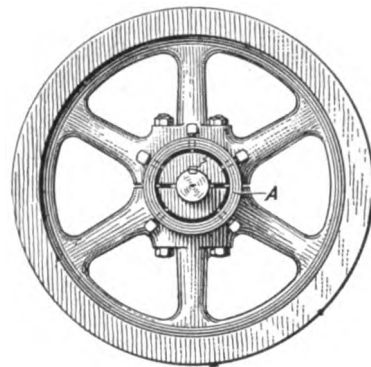
Answer:—We would suggest as a possible solution of your trouble that you examine the exhaust and inlet valve push rods. These rods should clear the val-

stems about 1-100 of an inch, so that the valve will surely seat at the proper time. If there is much more clearance than this, the valve would not remain open the proper length of time and would cause missing of explosions at certain engine speeds. If the push rod clears the valve less than 1-100 of an inch when the engine is cold, when the engine is heated up the valve stem will increase in length sufficiently to cause it to rest on the push rod at all times, keeping the valve from its seat and causing loss of compression. A small piece of carbon will sometimes work its way under the valve and hold it open enough to cause loss of compression although there should not be sufficient carbon in the cylinder to do this if the engine has just been overhauled.

We would also suggest that you examine the commutator and see that the revolving arm surely makes contact with the point that controls the cylinder.

Repairing a Balance Wheel.

From A. O. Stien, Minnesota.—One day when running a 2-horse-power Fairbanks gasoline engine that we use in our little repair shop, the engine began to pound. Sometimes the lower box of crank-shaft may loosen, but upon trying to tighten that, I found it all right as it was. I took hold of the balance wheels,



but did not turn hard enough, so as to locate the trouble. I started the engine again. It was the same. I let it run only a few revolutions, and as I stopped it, a small piece fell out of the hub on the governor side. The key was loose also, because the hub had cracked and a three-cornered piece fell out. Repairs are expensive, and I wanted to use the engine, so I made an attempt to fix it. I made a ring A, three-quarters of an inch wide by half an inch thick, and drilled five holes, 19-64-inch, where most needed, and threaded for 3/8-inch set screws. After tightening the set screws some we put a thin flat key between the halves of the hub, to keep the piece in place. Then we pulled up the screws. Although we did not get balance wheel dead true it quit pounding.

A Leaky Carburetter.

Question:—I would be glad if you would kindly advise me through the Trouble Department of your paper how to stop a leaky carburetter on a one-cylinder Cadillac. It leaks about one drop in thirty seconds when the engine is standing still. I have taken it apart but can find nothing wrong with it. I tried grinding in the valve, also putting a weight on the float, and finally put in a new float, but the leak

we would suggest that you examine the upper support of the float spindle and see that it is not out of alignment. If this support does not hold the spindle exactly perpendicular, it would probably not allow the valve to seat properly, even though it has been properly ground in. We would also suggest that you examine the valve seat for any small piece of lint or grit.

Spark Plugs.

Question:—Kindly state which is the best spark plug for dry batteries. Not the cheapest but the best at any cost.—W. E. K.

Answer:—It would be impossible to mention one kind of spark plug as being specially meritorious without doing injury to others which perhaps are equally satisfactory. This applies especially to the well known makes that bear the guarantee of the manufacturers.

Spark plugs are exposed to wide ranges of temperature, to carelessly used lubricating oil, to carbon deposits as a result of excessive fuel, and to mud and water, and naturally they are likely to not invariably give satisfaction. There are few points on the use of spark plugs which possibly may be useful to our friend, but more as reminders than as new information. The surface of the insulating material must be kept reasonably free from carbon, either in the form of burned lubricating oil or light soot from the fuel. Of course the surface should be kept smooth so that any foreign matter will not easily collect upon it, and for that reason it should not be scratched by files or emery cloth. If the battery is strong a long spark gives best results, but in case the battery is weak, shortening the distance between the points will make the spark more sure. A jump spark that looks sufficiently large in the open air may not be able to go through the dense charge in the compression chamber, and thus a misfire results. If of sufficient strength, it will jump $\frac{3}{8}$ -inch or more in the open air. Testing the plug will usually determine its condition, and whether or not the vibrator on the coil, if one is used, is vibrating properly, for the quality of the spark depends much upon the proper adjustment of the vibrator. If the plug is perfect and the vibrator working properly, the probable cause of trouble is the battery. Inspection of the spark will also usually determine whether the batteries have sufficient power, and a test of a battery should be continued for a minute or so, as it sometimes happens that a cell will show a good spark when first tested, only to absolutely die quickly, thus stopping the motor. Users of batteries should have a means of testing them individually, as one bad cell will destroy the proper working of the battery and removal of this cell will permit usage of the remaining ones in most cases.

A Cracked Water Jacket.

From F. W. B., Missouri.—The writer the other day noticed in our shop one of the workmen repairing a cracked water jacket, and he did so by drilling a small hole in the crack, and then taking a piece of copper drilled rod, threading it and screwing it in where this had been, and sawing it off and boring the holes so close together that one piece of drilled rod would be so close to the other one that it would bore out a part of it each time, and then sawing this off close to the water jacket, made a very good job, and saved putting on a patch.

grit, and place it in one quart of gasoline. Shake up the whiting and gasoline thoroughly. You will observe that the whiting settles instantly leaving the liquid as clear as water. To remedy this, add to each quart of the mixture 32 drops of oleic acid—no more, no less. Shake again and the whiting will not settle. By adding the acid it makes a better quality of polish.

This polish can be applied to gold, silver, nickel, brass, glass or any kind of metallic surface with a piece of cotton flannel, rubbing well. Polish with a piece of the same cloth or use a piece of chamois. This is a very good polish. It should not be left near any flame as it is inflammable.

For Foul Plugs.

From A. B. Wilson, California.—When an excess of oil fouled my plugs I removed and cleaned them several times, but would only get a few explosions and would have to again remove them and wipe off the oil. Finally I cleaned the ones that were missing and then opened the pet cocks of those cylinders and allowed the engine to run in that manner for several minutes until the oil was burned out and all the plugs were firing. I then proceeded without further trouble.

Who Knows Such a Firm?

From G. F. Smith, Ohio.—If any of your readers know of a firm that manufactures a spring for supporting automobile tops when folded down, will they please send the address to this publication? It is a coil spring with suitable ends, so as to fit on the top rest with one end and the other end holds the back up from the solid support and thus keeps the bows from being broken by taking up the sudden jars.

Putting On Driving Chains.

When the driving chains of chain driven cars have been removed for cleaning or repairs difficulty is sometimes experienced in replacing them. The operation will be facilitated by wrapping the chain around the wheel sprocket and bringing the ends together on the top of the jackshaft sprocket which forms a table or anvil, and renders the insertion of the connecting link easy. The future removal of the link will be aided if, in replacing it, the detachable side plate is placed on the outside, so that the retaining cotter pins or snap springs are easily accessible. The ends may be drawn together so that the link can be easily inserted by slipping a piece of annealed wire with a loop in one end between the links of each end of the chain after passing the free end of the wire through the loop, drawing it taut, thereby taking up any slack in the chain.

The Steering Gear.

See that the steering gear is always in good shape. When the steering wheels are out of alignment, as may be discovered from indications of unequal tire wear on the two front wheels, it is important to determine whether the difficulty is due merely to bent connections or knuckles, or whether a flaw exists somewhere in the metal. In such cases it is well to ascertain the real cause of the trouble rather than trust to superficial inspection by some one not much interested.

When the gasoline and lubricating oil are feeding into the cylinder in the smallest quantities that will produce good results, the motor should run for a long time without fouling the compression space or the sparking plugs, and on the minimum amount of oil.

Watch the Tires.

It will bear repeating: Do not run your car with the tires improperly inflated. Nothing will wear them out or possibly ruin them so quickly. Improper inflation is the commonest cause of rim-cutting. During the first ten days they are used tires should be frequently inflated, as the cover increases in size for the first ten days or so, and the air pressure is thus diminished. After the cover has reached its full dimensions, it will be sufficient to pump your tires less frequently.

A deflated tire should never be driven, as there is not only the certainty of damaging both tube and casing beyond repair, but the danger of loss of control and serious accident if high speeds are indulged in. An entirely deflated tire is easily detected by the unusually sharp jars transmitted to the body of the car, but often a soft tire is not detected until considerable dam-

age has been done by rim-cutting. If the following is borne in mind the deflated tire may be detected before enough deflation has taken place to cause serious damage.

A deflated front tire will usually make itself known by the difference it causes in the sensitiveness of the steering apparatus. A deflated rear tire, especially if there be much weight in the rear of the car, often gives a peculiar "feel" to the steering wheel, as if the vehicle were traveling over a greasy road. The rear of the car swings about abnormally with a slight skidding tendency. When a driver feels this sensation on a good dry road he should think of his rear tires.

Do not try experiments with the lubrication of a disc clutch; keep to the brand of oil recommended by the makers.

FINE RECORD FOR EMPIRE TIRES.

The Empire Tire Company of Trenton, N. J., received a report at the finish of the four days' endurance contest of the Harrisburg Motor Club, to the effect that the two cars equipped with Empire tires made the entire run without having to remove one case or tube, and the tires were in splendid condition at the finish.

The run was an extremely hard one, the bad weather having made the mountain roads much worse than usual. It is a noteworthy fact that the Empires were the only tires in the run that went through with an absolutely clean record. Seven

in igniter cables? "We are making primary and secondary igniter cables of a quality which resists breaking at the terminals, resists deterioration and the troubles which arise therefrom," said O. J. Woodward of the Diamond company. "We have found that much less attention than the subject deserves has been paid to the cable question by the trade in the past; but there is seldom a man who isn't interested when the possible range in qualities in this field and the results to be expected, are once made clear."

EMPIRE TIRES.—It is probably hardly necessary for us to call attention to the full

magneto to many old model cars has proven one of the most popular movements made by the Remy Electric Company of Anderson, Ind. Many owners of cars of 1907 and 1908 and even earlier vintage, and which were not originally designed for use with magneto equipment, have been anxious to equip their cars with this universally adopted form of ignition but have not cared to stand the expense or trouble involved, necessary to gratify this desire. The Remy Company has met this want and gained many friends among owners and dealers by manufacturing and keeping in stock these fittings which are sold with complete instructions for installing at the minimum cost of making them permit old cars to be equipped with practically no expense or trouble.

The Remy Company has just received the signed contract from the Overland Automobile Co., of Indianapolis, Indiana, specifying 16,000 Remy High Tension Magnetos for use on their cars during the season of 1910.

MOVED UP TOWN.—The National Sales Corporation have moved from 206 Broadway, New York, to 232 West 58th Street.

FLAKE GRAPHITE FOR PREVENTING SQUEAK IN SPRING.—To prevent springs from squeaking flake graphite gives instant relief. The springs may be taken off or the leaves separated by jacking the body up so as to take the weight off the springs, then some graphite may be floated between the leaves with kerosene or oil. This will give lasting lubrication and at the same time will not catch dirt or dust as plain oil or grease will. In this connection if Dixon's Motor Graphite is used on the inside of tire shoes, it will prevent the shoes from sticking. Rims may be also advantageously treated with flake graphite as a preservative of rust. The application of a thin coating of quick drying shellac varnish to which some flake graphite has been added has been found to give good results, also if all threaded connections are made with graphite and oil, or better yet a specially prepared graphite joint compound, the joints may be easily taken apart at any time.

REMOVAL.—The W. J. Kells Mfg. Co., formerly at 62-66 Van Winkle Avenue, Jersey City, N. J., have removed their business to larger quarters at 726-728 11th Avenue, New York City, where they are prepared to fill orders for "Kells' Honey Comb Water Coolers," also auto supplies, mufflers, aluminum dashboards, hoods, coil radiators, mud guards, fans, gasoline, oil and water tanks, sheet metal aprons, etc.



different makes of tires were represented in the run.

The two cars using Empire tires were Pullmans. The small Pullman car won first place in its class, but the large Pullman struck a dog near Sunbury, breaking the radiator, which caused a two hours' delay.

DIAMOND IGNITER CABLE.—One feature of a large factory devoted exclusively to rubber covered wires and cables, which The Diamond Rubber Co. of Akron, O., erected a couple of years ago, is now attracting considerable attention in the automobile trade. This is the division devoted to igniter cables for automobiles. The subject is one to which the motoring public and the trade in general have given comparatively little attention. How many automobile owners know, for instance, that poor insulation, due to ageing of the rubber, or other cause, allows the "juice" to leak and produces a weak spark? How many know what constitutes high quality or otherwise

page announcement in our advertising department of the Empire Tire Co. of Trenton, N. J. They direct particular attention in their advertisement to the manner in which their tires stood in the Harrisburg Motor Club contest. They also emphasize the superior qualities of their tires. But write for further particulars and price or ask your dealer about them.

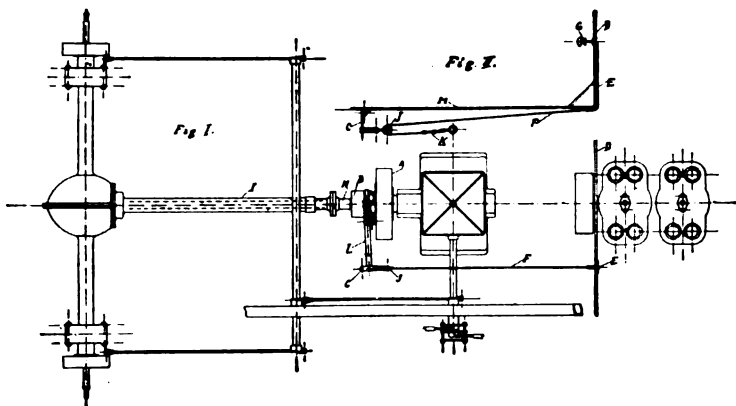
WE understand that the Anderson Motor Co. of Anderson, Ind., recently organized, has purchased the motor and accessory business of the Westerfield Motor Co. and will continue the manufacture of the Westerfield Motor and Transmission in a new brick plant now being erected. E. F. Dice, Secretary and General Manager of the new company, has been superintendent and designer for the Westerfield Motor Co. for the past three years. T. C. Werbe is President and Treasurer and U. G. Hodson, Vice-President.

CHANGING TO MAGNETO EQUIPMENT.—The manufacture of fittings for equipping their

A NEW ELECTRIC STARTING DEVICE.

The self starting of an automobile adds much to its convenience and usefulness. Thus far few cars have adopted such a device, owing to the possible fact that it is difficult to accomplish. The Gardner Engine Starter Co., of 1451 Michigan Ave.,

agency brake and allows high speed lever to remain at high speed. The switch plug is then removed and engine is stopped. The operator on entering car, preparatory to starting, replaces switch plug, grasps a knob, pulling it directly toward him until the engine starts, approximately a distance



Starter Applied to a Shaft Driven Car.

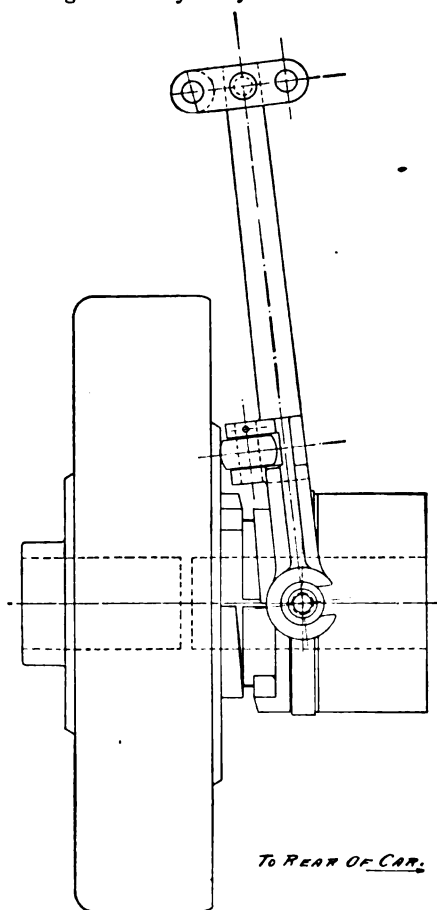
Chicago, is now putting upon the market an automatic starter that is not only low in price but it is claimed accomplishes all that is required of a starter, as it spins the engine exactly as by hand. It will start

of four inches. The knob must be held out until the engine clutch has been disengaged. High speed lever is then brought to neutral or desired speed, the emergency brake lever released and the car proceeds as usual. To rewind the spring after car is under way, the knob is pulled and foot brake applied. The knob may be released at any time after the foot brake has been applied.

In the illustrations, Figs. 1 and 2 show the method of applying to a shaft-driven car, and although considerable space would be required to give details of its application, it is not at all complicated. Fig. 3 gives a general view of the compactness and strength of the device. Two styles of the Gardner Starter are made, one for heavy and one for light cars. If further information is desired concerning this invention, address the Gardner Starter Engine Co., 1541 Michigan Ave., Chicago, Ill., and mention the AUTOMOBILE DEALER AND REPAIRER.

THE IRVING OVERHEAD VEHICLE WASHER No. 3.

We illustrate an excellent vehicle washer, recently brought out by the I. J. Smith Mfg. Co., 4284 Park Ave., New York City. It is styled The Irving Overhead Vehicle Washer No. 3, and it has many points of superiority over the machines previously introduced by the same company. This washer is justly styled "indestructible," as it is at least durable for an indefinitely long period. The device is constructed almost



General View of the Starter.

any kind of an engine and whether magneto or battery is used; and is easily installed. It is an exceedingly simple spring device and may be attached at any convenient point on the driving mechanism, from engine flywheel to rear hubs, but is preferably installed in place of the drive shaft brake drum, the latter being removed and the starter substituted. The brake band is shortened or lengthened to fit over the starter.

In its operation the driver, on bringing the car to a standstill, applies the emer-

entirely of brass. By a simple mechanical arrangement a positive automatic water cut-off is provided, thus affording a great saving in the cutting down of water bills, saving of hose and saving time. Of course, the cost of this washer is a trifle more than that of less perfect machines, but this washer will last a life time and will eventually pay for itself many times over. No private or public garage owner will regret buying one or more of these machines. Write for Catalog A to the I. J. Smith Mfg. Co., 4284 Park Ave., New York City.

Subscribe to the "Automobile Dealer and Repairer," \$1.00 Per Year.

THE REINHOLD "NOFLUX" ALUMINUM SOLDER.

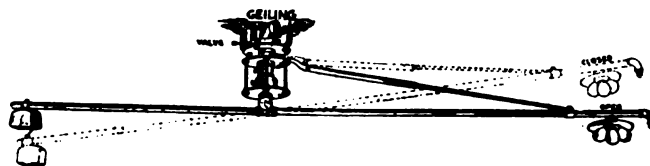
This solder, for soldering aluminum to aluminum, has been on public sale since September, 1908, and it has been under continuous tests of all kinds since February, 1908. It makes a joint of great tensile strength; in fact, the parts soldered together are stronger than the metal itself, and the solder does not disintegrate the metal, no matter how long a time the article is soldered. This solder contains no mercury or lead, does not corrode with time and is not affected by electric current passing through it. It has practically the same color as aluminum, which is a desirable feature. It is extremely easy of application, as any person can use it with an ordinary blow-pipe or gasoline torch, or even with a heavy soldering iron. Absolutely no flux is needed, thus saving time and expense and providing an additional safeguard against corrosion. This solder flows freely on all parts soldered and effects a perfect joint. Automobile parts are easily and quickly mended by use of this solder, and no repair shop should be without it. By using a flux aluminum may be soldered to copper, brass or any metal ex-



cept cast iron. The cut gives an idea of the appearance of the Reinhold Soldering Outfit. Send 25 cents or 50 cents for sample bars, or send for full description and direction sheets, which are furnished free. Address all inquiries to the Electrical Maintenance & Repair Co., Sunday Call Building, Newark, N. J., and mention this journal.

AUDEL'S GAS ENGINE MANUAL. Theo. Audel & Co. Publishers, New York. Price \$2.

This is an exhaustive work on the theory



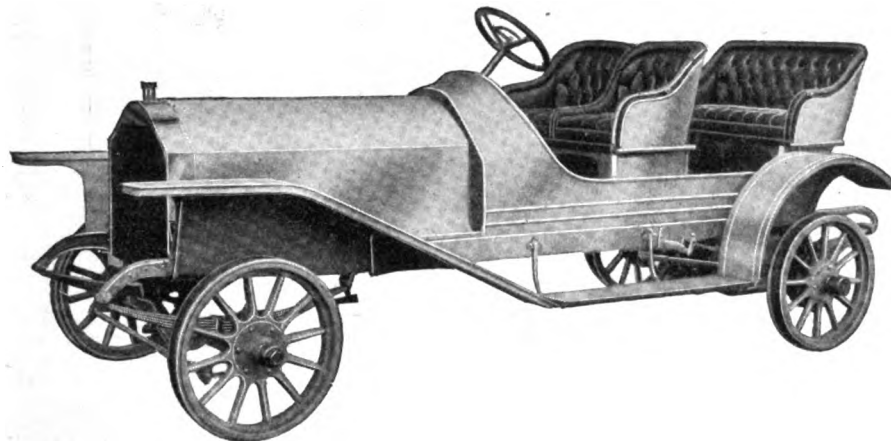
A New Vehicle Washer.

and management of gas, gasoline and oil engines, producer gas plants, marine motors and automobile engines. It is arranged in twenty-seven chapters and each subject is divided in sub-headings or principal paragraphs; these are numbered from 1 to 388. In presenting the work in this way, it becomes easier for the student to understand the subject matter of the book as he progresses from its first principles to its latest developments.

It is a handsome, well printed and conveniently arranged book, well illustrated and will be found extremely useful to owners, operators and students of internal combustion engines.

BORBEIN CAR READY FOR POWER.

These cars are built up ready for power, by the Borbein Automobile Co. of St. Louis, Mo. The specifications are as follows: Front axle I-Beam style, 23 inches high, with annular ball bearing spindles. Rear axle shaft drive, ratio 2½ to 1, with internal also external brakes near the rear wheels. Wheel base 120 inches, and track 56 inches. The artillery wheels have quick detachable steel rims on same, ready to



Borbein Four Passenger Roadster.

take 34x4 inch pneumatic tires. The body is built with seats low down and high cushions, upholstered with dark green leather. A metal shield is fastened back of dash, and extending to rear part of front seat. Re-inforced metal fenders and running boards are all fastened in place. Built for a four-cylinder motor. Price with one coat of lead paint, including radiator hood and wheel steering device as shown \$598. This firm builds all styles of running gears, bodies, axles and wheels for the trade.

PROPER INFLATION OF TIRES.

There are few parts of a car that give less trouble than the tires if they receive intelligent care, but intelligent care is ne-

kills the resiliency of the tires and eventually ruins them, besides subjecting the mechanism of the car and its occupants to constant shocks and jars, which are the very evils the pneumatic tire is designed to prevent. Of the two errors under-inflation is the worst, however. Deterioration is from three to five times more rapid in the latter case than in the former. Beginners are nearly always the worst offenders, and being afraid of inflating their

tires too much, rarely inflate them enough.

Edward Michelin, the well known tire manufacturer, who is a skilled scientist and who has made a lifelong study of rubber and its peculiarities, once observed that, although over-inflation was a common fault, fully 50 per cent. of the tires tested at the Michelin factories and branches were insufficiently inflated.

"Don't be afraid of bursting the tires," says Mr. Michelin, the well known tire manufacturer. "The tires will stand as much pressure as an ordinary tire pump can put into them." The air pressure in the tire should be proportioned to the weight of the car and its occupants, the size of the tires and the horse-power of the motor. This difficulty can be overcome by using the "Wyman" tire tank, which has a combination valve and regulator, and regulates exactly the number of pounds pressure in your tire, and prevents blow-outs, which are caused by over-inflation.

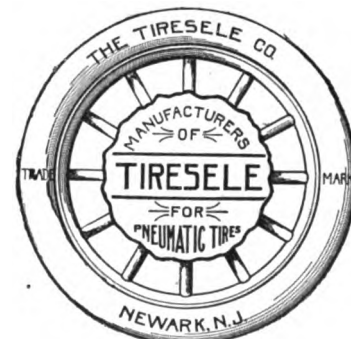
We herewith illustrate this clever device in detail. The Wyman Tire Tank is manufactured and sold by the Auto Tire Inflating Co., 104 South Eighth Street, Brooklyn. This company will gladly send you interesting free circulars and full information, if you will take the trouble to mention this journal. They also manufacture the Wyman Whistle Outfit for motor-boats.

"STAY SHINY."—This is advertised in our want department by F. R. Schmoeger, Sterling, Ill., and is not, the manufacturer explains, a metal polish at all, but rather a wonderful finish for the prevention of tarnish and discoloration of all polished metal surfaces. It is a colorless liquid, which is applied with a camel's hair brush, after the article to be finished has been thoroughly polished. It forms a thin invisible coating over the metal that preserves the original high polish, producing a beautiful lustrous finish, said to be as hard as flint and as smooth as glass. This finish is claimed to be absolutely grease and water proof and will stand all heat and weather exposure. The same party is manufacturing Magiclean Wood Polish, a liquid preparation for cleaning and polishing automo-

biles. It restores the lustre and surface to the body, leather trimmings, cushions and top, but consult the advertisement and in ordering please mention the AUTOMOBILE DEALER AND REPAIRER.

"TIRESELE" AS A TIRE TROUBLE REMEDY.

"Tiresele" is a fine powder which is guaranteed to repair all rubber inner-tubes on automobiles, without removal of the shoe. The powder is mixed with water and the liquid mixture is injected into the inner tube through the valve stem, by a special gun designed for this purpose. With "Tiresele" at hand the dreaded puncture is robbed of its terrors. The tubes of tires should be charged with "Tiresele" before starting on a trip. This can be done without soiling hands or clothes, as the powder is perfectly clean. Then, if you get a puncture, by nail or piece of glass, wire or any sharp article, just withdraw the nail and "Tiresele" mixture will act at once. If any loss of air has taken place, blow up the tube and your troubles are over. If the tube has not been charged when puncture occurs, withdraw obstacle, charge tube through valve stem and blow up tube. "Tiresele" does not injure rubber in the least; in fact, adds to its life and in no way affects vulcanizing, and is harmless to hands, clothing or varnish. "Tiresele" is sold under the strongest possible guarantee. Thirty days' trial is allowed, and if results are not fully satisfactory, money will be refunded. Surely, nothing could be more satisfactory than this. Considerable territory is still open

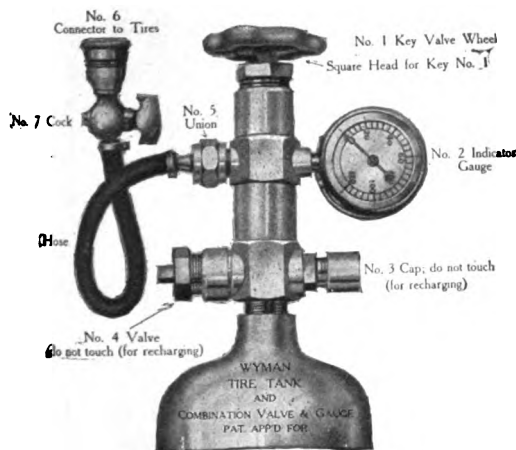


for good agents. The genuine "Tiresele" may be distinguished by the peculiar trademark, cut of which accompanies this article. Write for interesting free literature and copy of guarantee to The Tiresele Co., 53-59 Bank St., Newark, N. J. Mention this publication.

IS ANYTHING THE MATTER WITH YOUR MOTOR?—If so, it may be to your advantage to correspond with the Brennan Motor Mfg. Company of Syracuse, N. Y. The announcement of this company will be found on another page. They say that the Brennan Motors have stood every test for reliability. These motors can be fitted to all makes of cars. They run very quietly and smoothly. Write to the manufacturers as above for further particulars and price and mention the AUTOMOBILE DEALER AND REPAIRER.

A GOOD SPEEDOMETER FOR ONLY \$19.00.—An extraordinary bargain is offered this month in our advertising columns. The 1909 Model Riverside Speedometer, described as a high-grade instrument equal to those regularly sold for \$75.00, is offered for only \$19.00. Many will wish to improve this unusual opportunity. Address the Excelsior Tire Co., 1775 Broadway, New York City, and mention this journal.

Subscribe to the "Automobile Dealer and Repairer," \$1.00 Per Year.



The Wyman Tire Inflator. Showing Constituent Parts. Manufactured by the Auto Tire Inflating Co., 104 South Eighth St., Brooklyn, N. Y.

cessary to secure the best results and little details should not be overlooked. Here, as elsewhere, it is the "little things" that count. For instance, proper inflation is very important and it is surprising how few car owners give this subject the attention it deserves. Proper inflation does not mean simply to keep the tires "pumped up hard," for too much inflation is about as bad as not enough. Over-inflation stretches the tires' fabric unnecessarily,



PREST-O-CARBON REMOVER.

Thousands of engines are ruined every year by being torn to pieces and scraped besides costing \$15 or more. **Don't Do It.** We positively guarantee that Prest-O-Carbon Remover, injected into the cylinders according to directions, will dissolve every particle of carbon, and INCREASE the POWER, COMPRESSION, DURABILITY of your engine. No injury to the metal.

One quart at \$1.00 will do the work. You can do it yourself. Our reputation is back of this.

Gal. \$3.75 ½ Gal. \$2.00 1 qt. \$1.00

PREST-O-LITE CO.,

251 South St., Indianapolis, Ind.



us about Economy Tires. They are not that kind.

BEEBE-ELLIOTT CO., - Racine, Wis.

Here is ECONOMY

in tires that keep nalls and anxiety out and that hold air and confidence within. You never saw their like, for they have a renewable tread, steel studded. Put a new tread on next season if you wear out the first one this year. Unless you prefer tires that cost as much, skid, puncture and blow out, better ask



O'NEIL-WILLIAMS THREE-CAVITY VULCANIZERS

Will accommodate all sizes of tires. Each cavity contains three separate steam chambers for the purpose of applying heat to repair, only.

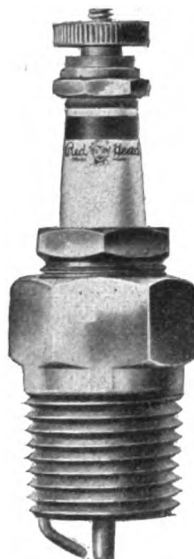
Inner Tube Vulcanizers, Bead Molds, Air Bags, etc. WRITE FOR BOOKLET.

The O'Neil Tire & Protector Co., Akron, O.

THE "RED HEAD" SPARK PLUG.

The "Red Head" Spark Plug, though comparatively new on the market, is the result of years of experience on the part of men pre-eminently versed in the construction of spark plugs. The shell or base is of excellent design. The bushing is forced down upon the shoulder of the porcelain to make a good, tight joint. One copper asbestos washer only is used and that is between the inner shoulder of the porcelain and the shell of the plug. The porcelain is of the strong cylindrical type with ample asbestos packing at both ends of the spindle to prevent possible leaks and blowouts. The clay from which it is made has been specially treated and aged to produce a non-breakable insulator which we guarantee will not crack from heat. A special baking process is used to add to the durability of the porcelain.

In the mica plug the core (which is in-



The "Red Head" Spark Plug.

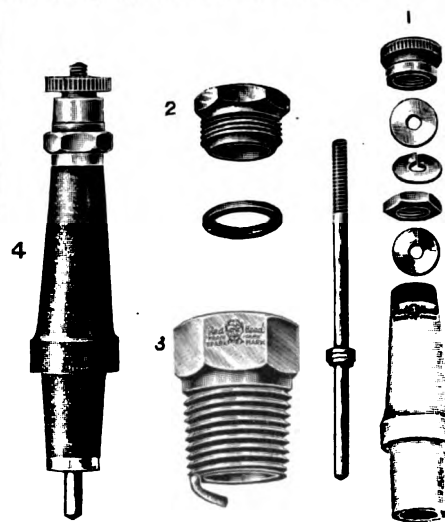
terchangeable with the porcelain) is specially prepared under a secret formula. It is pressed into a compact, almost homogeneous mass, in a special press. There is absolutely no chance for this core to become disintegrated. The sparking points are exceptionally large, made of suitable material and pre-ignition is impossible. In fact, every good feature found in the best foreign and American plugs is embodied in the "Red Head." No matter what price you may pay, you cannot buy a better constructed plug for steady service.

This excellent spark plug is manufactur-

Send for free sample of The Automobile Dealer and Repairer.

MOTOR VEHICLE PUBLISHING CO.,
24 Murray St., New York.

ed by the Emil Grossman Co., 232 W. 58th St., New York, to whom all inquiries should be addressed. See the remarkable offer of a free sample spark-plug made by this company in their new announcement



The "Red Head" Spark Plug, Disassembled.

on our front cover this month. This is a great opportunity for many of our readers to obtain a fine plug without cost. Also please send to the same company for their new copyrighted book, just out, called "Sensible Don'ts," a concise, but exceedingly valuable book of instructions on the care of ignition, carburetion and lubrication systems of the motor. This book will be sent to you absolutely free of charge, if you mention the AUTOMOBILE DEALER AND REPAIRER. Send for it before you forget it.

DIXON GRAPHITE AXLE GREASE.—The attention of our readers is directed to the announcement in this issue of the Joseph Dixon Crucible Company, Jersey City, N. J. The basis of Dixon Graphite Axle Grease is, of course, graphite in the flake condition. We doubt if anybody who has ever used this axle grease will consent to have any other. The manufacturers would like to send a FREE SAMPLE to every reader who will take the trouble to write for it and mention the AUTOMOBILE DEALER AND REPAIRER. It should be remembered that this axle grease is unaffected by heat, and does not muss up the axle as is the case with common axle grease.

NEW PERMANIT AGENCY.—A new agency in New York for "Permanit" has been opened in the Thoroughfare Building, 57th Street and Broadway, New York City. This agency will handle Permanit for the entire State of New York. The agency is in charge of W. L. Roder, proprietor, and M. J. Stilger, manager. "Permanit" makes tires puncture proof.

IF IT'S GRAY'S—IT'S THE BEST

Gray's (Standard Touring Necessities are sold under Guarantee. If your dealer hasn't Gray's goods, he isn't giving you a square deal. **ASK FOR GRAY'S.**

Gray's Insert	Soapstone
Fill-Gum	Clutch Compound
Fill-Gum Outfit	Carbo-Sol
Vulcanizing Outfits	Lustral Metal Polish
Rubber Cements	Lustral Unburnable
Patent Patch	Cleaner
Tire Patches	Curo-San
Everwear Tire Band	Varno-Vim
Blanco Tire Band	Lamp Connections
Resisto Tire Band	Gas Bags
Waterproof Tire Band	Rubber Bumpers
Squeeze-It	French Tire Pumps
Furno-Lac	Selected Anti-Friction
Valve Grinding Compound	Powder



USE GRAY'S FILL-GUM OUTFIT

Permanently Repairs

STONE-OUTS, DIGOUTS AND GOUGES

ADDS 1000 MILES TO THE LIFE OF YOUR TIRES

\$1.00 JOBBERS AND DEALERS \$1.00

— OR —

STANDARD LEATHER WASHER MFG. CO.,

Newark, N. J., U. S. A.

Please mention the Automobile Dealer and Repairer when writing to advertisers.



The Oil that Turns Minutes to Miles

Vacuum MOBILOIL relieves your automobile of wear and friction, and leaves it free to wrestle with the minutes and the miles. It makes perfect lubrication a scientific certainty, and saves paying for experiments and accidents, disguised as repairs.

VACUUM MOBILOIL

is made in six different grades for various kinds of automobiles. One of these grades is the *one oil*, the label of which guarantees it to be exactly suited to the requirements of your car.

Do not experiment. Write for free booklet, listing every automobile made and showing grade of MOBILOIL necessary for its perfect lubrication. Also contains track records to date and other facts of vital interest to motorists.

MOBILOIL in barrels, and in cans with patent pouring spout, is sold by dealers everywhere. Manufactured by

VACUUM OIL CO., Rochester, N. Y.

FIND OUT

all about the

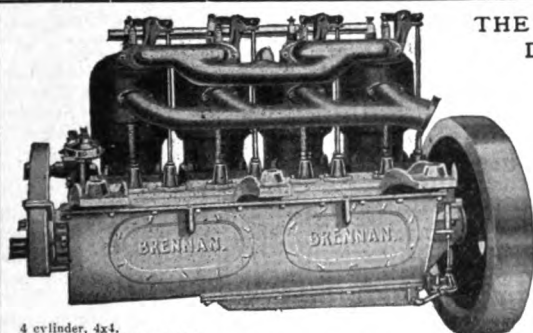
Diamond

line of Repair Material, Tread Stocks, Tire and Automobile Accessories.

Complete in every detail and Diamond Quality throughout.

New illustrated catalog is yours for the asking.

THE DIAMOND RUBBER CO.,
AKRON, OHIO.



THE EFFICIENCY OF A CAR
DEPENDS LARGELY UPON THE
MOTOR.

TO BE ENTIRELY RIGHT
GET A

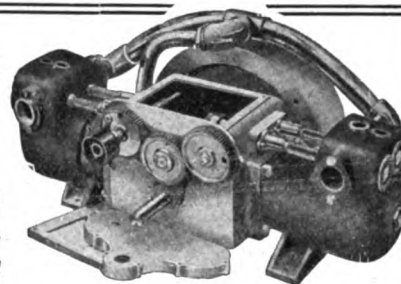
BRENNAN MOTOR

Have stood every test for reliability and have proved themselves *par excellence*. YOU CAN HAVE ONE on your car for they can be furnished mounted complete with transmission gears on sub-frame to fit all standard makes of cars, such as Aerocar, Olds, Pope-Hartford, Cadillac, Wayne, Queen, Ford, Marion, etc. The Brennan Motors are the quietest and smoothest running on the market.

4 cylinder, 4x4.
4 cylinder, vertical, 4 9-16x4.
4 cylinder, vertical, 4 9-16x5.
4 cylinder, vertical, 6x5.
4 cylinder, vertical, 5 1-2x6.

4 cylinder, vertical, 6x6.
6 cylinder, vertical, 4 9-16x5.
Four and six cylinder chassis to order.

BRENNAN MOTORS are guaranteed to wear longer and to give more service than any other motor and the price is right. Let us tell you about them.



2 cylinder, horizontal opposed, 4 9-16x5 annular ball bearings.
2 cylinder, horizontal opposed, 5x5 annular ball bearings.
2 cylinder, horizontal opposed, 5 1-2x5 annular ball bearings.
2 cylinder, 4x4, 4 3/4x5, 5 1/2x6 and 6 1/2x7.

We manufacture MOTORS and TRANSMISSION GEARS.
Write for full particulars. **BRENNAN MOTOR MFG. CO., Syracuse, N. Y.**

The Carburetter Float.

Floats in carburetters are usually made of cork, and even in such cases they are made non-absorbent by coating them with some material which will prevent the gasoline soaking into them, the theory being that the cork float will not displace more gasoline under suction than its own weight, and the Archimedes rule is that "A body submerged in a liquid appears to lose a part of its own weight—the amount lost being equivalent to the weight of an equal bulk of the liquid."

Carry a Rubber Tube.

A piece of rubber pipe should be carried on the car for connecting up the lamp gas tubes. This will come in handy in the case of the fracture of the gasoline pipe, but if this is not to hand, it is better to cut up the pump connection than to have the car towed home.

For Stains.

Tar should be removed while the stain is fresh. It is not even safe to wait till reaching home, but after driving over freshly sprayed tar the car should be stopped for cleaning at the next village. Butter is the best solvent for removing tar from the coachwork, while for cleansing the hood or personal clothing a bit of cotton waste dipped in gasoline is as good as anything.

Draining a Radiator.

If the radiator drain cock is so placed that the water from it strikes the axle and spatters over things generally, it is a good plan to place the edge of a funnel against the valve and thus direct the flow of water away from the parts of the car into a pail.

WANT ADVERTISEMENTS.

Under this head will be printed advertisements of shops for sale or to rent, or shops wanted, or situations or help wanted, or tools or machines (second-hand) wanted or to exchange, at the uniform price of two cents a word, which will include the address, for each insertion, payable in advance. No advertisement will be inserted for less than 30 cents, however small.

Remittances can be made in postage stamps if more convenient. Address,

MOTOR VEHICLE PUBLISHING CO.,
24 MURRAY STREET, NEW YORK.

STEAM CAR OWNERS—Subscribe for Steam Motor Journal, monthly, devoted to steam cars. 1409 Welton street, Denver, Col. Price, 15 cents; \$1 year.

FOR SALE—Steam Automobiles; write for illustrated bargain list. F. W. Ofeldt & Sons, Nyack, N. Y.

BUY FROM THE ORIGINAL OWNERS—Over 500 private owners have listed their automobiles with us for sale. Among them are many choice bargains. Write us about what you want. The Motor Car Exchange, 605 14th St., N. W., Washington, D. C.

COMMERCIAL MOTOR VEHICLES—Read the "Power Wagon" for reliable information concerning motor trucks, motor buses, motor cabs and other machines employed for business purposes. Issued monthly; single copies, 10 cents; \$1 a year. The most valuable paper of its kind published. The Power Wagon, Metropolitan Block, Chicago.

I OFFER MY 1907 24-H. P. BUICK CAR for \$600. It is in excellent condition and this is an opportunity for any one desiring to get a fine car very cheap. W. F. Whitaker, 518 West 145th St., New York, N. Y.

NEW and second-hand engines, transmissions, radiators, carburetors, mufflers, steering gears, timers, coils, springs and everything for the assemble. We also rebuild motors, repair cylinders with lost compression, frosted water jackets and radiators. Write for estimates. Address Auto Parts Exchange, 3702 6th Ave., Des Moines, Iowa.

JEWEL, PREMIER and Jackson automobiles for sale at rock bottom prices; also from 10 to 30 good second-hand cars on hand at all times from \$100 to \$1,000. If you want an auto write me and I can give you prices that will surprise you. Any make car you want. Middlebury Auto Garage, 888 and 890 East Market St., Akron, Ohio.

A NEW TIRE PROTECTOR.

The Walker Auto Tire Band Co. of Indianapolis, Ind., manufactures an automobile tire protector that protects the tires against wearing, bursting, cutting, etc., and is so arranged with a series of staggered metal plates on the tread as to prevent skidding and slipping, and as a consequence



The Walker Tire Protector.

gives added traction to the machine. The protector is composed of sections or bands of Sea Island cotton fabric three inches wide coated on their inner and outer surface with rubber, the center of each being reinforced with a strip of chrome leather between the metal plates and the band proper. The plates are secured to the band by means of 1-8 rivets swedged in

SHINEBRIGHT METAL POLISH is absolutely the best on the market; sample and quotation furnished upon request. Shove & Gage Co., Inc., Providence, R. I.

FOR SALE—A Packard Touring Car, 34x4 tires, rear tires new; top, lamp, tools, etc. Taken in trade; no use for it. Will sell cheap if taken at once. Address C. M. A., Box 126, Voluntown, Conn.

ALMOST a present, my Stanley steam roadster, 18-inch new boiler under hood. J. M. Barber, North Adams, Mass.

RUNABOUT, POPE TRIBUNE, Shaft Drive, sliding gear transmission, wheel steer; fine shape, \$250. C. Eugene Cardner, New Woodstock, N. Y.

FOR SALE—Pope-Tribune Model 4 touring car; 14 h. p.; first class condition and extras; price, \$250. Cash, L. B. 196, Tolland, Conn.

ONE G & J tires, new, 34x4, complete; sold machine; \$35. L. C. Hull, Winterset, Ia.

FOR SALE—Handle-bar fits, "Marsh" Messenger saddle, patterns of 1 1/4-h. p. bicycle engine. Roy A. Cridfield, 225 Third St., Lincoln, Ill.

FOR SALE—One Rochester Runabout steamer in good condition, \$60.00. One steam Locomobile with leather top, \$90.00. One new 2 1/4-h. p. motor cycle engine, \$40.00. Daglish Machine Co., 177 Front St., Rochester, N. Y.

WANTED—Water tank, hood and condenser of 1906 White steamer. State condition and price. Jos. Fling's Sons, Germantown, Philadelphia, Pa.

FOR SALE—Orient buckboard, just overhauled and revarnished; has three new tires; will sell cheap. Address Box 145, Somerset, N. Y.

FOR SALE—My 1908 Reo touring car, in absolutely perfect condition; full set of lamps, good top, two new extra tires, which have never been used; car cost me \$1,325; price for quick sale \$675. Address Fred H. Fuller, P. O. Box 250, Hartford Conn.

FOR SALE—1907 Columbus Electric, cost \$1,690, with three new tires and new batteries, very cheap. Harrisburg Auto Co., Harrisburg, Pa.

FOR SALE—Model "F" Stanley, equipped with top, lamps, good tires, first class shape, also model "DX" Stanley light touring car. Geo. G. McFarland, 3rd and Hamilton Sts., Harrisburg, Pa.

tapering holes. Each band is equipped with a hook on either end for hooking in the clinch of the rim, and being put on with the tire deflated, prevents any possible chance of creeping or chafing after the tire has been inflated. In addition to their regular metal tread bands, which may be either used as a complete tire protector or blowout patch, they make two styles of plain bands for emergency patches which are just the same as the regular protector with the exceptions of the metal plates on the tread. One of these bands is equipped with hooks for hooking in the clinch of the rim, while the other is supplied with strap and buckle for strapping around the rim which makes a very desirable emergency patch for tires not having the regular clinch. Owing to the fact of increased facilities the company has just recently moved into larger quarters and are now located at 18 S. East St., Indianapolis, Ind.

A SEVENTY-FIVE CENT "FRY" SPARK PLUG FOR TEN CENTS.—We wish to call the attention of every reader to the sensational offer made this month in our advertising columns by the Standard Sales Co., 1779 Broadway, New York City. These people are selling agents for the celebrated "Fry" Spark Plug, a plug noted for its strength, simplicity and all-around merit. In order to introduce this plug to our readers, the Standard Sales Co. will send a sample plug (regular retail price 75 cents), if you will cut out their ad and mail in to them with ten cents in stamps to pay cost of postage and packing. This offer is only

TOPS—We manufacture highest grade automobile tops for all standard cars at prices almost beyond belief. Send for samples, specifications and letters from all parts of the country praising our product. We save you 50 per cent. Jenkins Specialty Mfg. Company, Sumter, S. C.

FOR SALE AT A BARGAIN—One 1909 No. 30 Premier automobile and Diamond tires and two systems of ignition. Auto Chime Horn. Never been used. Kirchdorfer, 918 Baxter Ave., Louisville, Ky.

FOR SALE—Borough of Queens. Real Estate. Good location for garage, 410 to 424 Jackson Ave., Long Island City, on plaza facing entrance of Queensboro Bridge and 100 feet from roadway connecting Thompson Ave. with plaza; also Plot on Thompson and Nott Avenues, entrance both avenues. John L. Klages, 37 Vernon Ave., Long Island City.

WANTED—Twelve or Fifteen Horse Power Gasoline Motor, second hand, for automobile. David Lamont, Canajoharie, N. Y., R. F. D. No. 2.

POPE-HARTFORD, 10 h. p., \$250. Reliance, side entrance, 20 h. p., \$350. Foster steam car, 78-in. wheelbase, \$150. For photographs and particulars address Lock Box 323, Barre, Vt.

FOR SALE—1908 Reo Touring Car with top and speedometer, in first-class shape. Reason for selling, want 1909 Reo. First best cash offer takes it. W. J. Olmstead, Shabbona, Ill.

TOPS—Until further notice, runabout tops \$20, touring car tops \$35. C. G. Meyer & Son, Tiffin, Ohio.

FOR SALE—Holzman No. 9, good as new, only run a few hundred miles; two or four passenger; cost with full equipment \$800; will sell for \$400; have larger car. J. H. Sides, Chestertown, Md.

WANTED—Hustling Agents and Garages to sell "Stay Shiny," the marvelous tarnish preventive. One invisible coating preserves original high polish and absolutely prevents tarnish on lamps, radiators, etc., indefinitely under heat, rain and all weather conditions. Fully guaranteed. Easily applied, enormous demand and profits. Every auto owner buys. Regular can \$2.00, sample can 50 cents, silver. Express prepaid. Address F. R. Schmoege, Sterling, Ill.

60 H. P. 4-CYL. HAYNES motor, new, full equipment, double ignition, price, \$300. Walker Hose Clamp Co., Battle Creek, Mich.

a temporary one and should be taken advantage of immediately. Send for a sample plug before you forget it, to the Standard Sales Co., 1779 Broadway, New York City. Send also for free descriptive circular.

A NEW company has been formed in this city under the name of the St. Louis Supplementary Spiral Spring Co. (Inc.) and it is located at 202 Motor Mart Building, 62d Street and Broadway. This company will represent the Supplementary Spiral Spring Co. of St. Louis. The rapidly growing business of this company has made it necessary for them to have an eastern representative. The advertisement of this company will be found on another page and those writing them for further particulars concerning their springs are requested to mention the AUTOMOBILE DEALER AND REPAIRER.

A UNIQUE PROPOSITION.—Under the name of "Permanent," care of this office, will be found in this issue a quarter-page advertisement headed, "A Good Contract Is Good for Both Parties." Dealers everywhere are offered a chance to build up a profitable and permanent business of their own for the sale of cars and accessories. Write at once for further particulars. It is doubtful whether this advertisement appears again, so do not fail to grasp this chance.

ENLARGING THEIR PLANT.—Geisler Bros. of 518 W. 57th Street, New York City, have found such a large and increasing demand for their non-sulphating storage battery igniters that it has been necessary to take another floor.

Please mention the Automobile Dealer and Repairer when writing to advertisers.

FIRE! FIRE! FIRE!



Lookout There! Everybody! The Fire Chief is coming in his automobile and ALL FOUR WHEELS are equipped with WALKER AUTO TIRE BANDS.

After making inquiries, investigating and watching results obtained by others who were using **Walker Auto Tire Bands**, the City of Indianapolis decided to try **Walker Auto Tire Bands** in the city fire service. Accordingly arrangements were made whereby they were permitted to try a complete set of **Walker Auto Tire Bands** for one week before accepting them. During this time they found they were enabled to maintain the highest possible speed around corners and make sudden stops without the least possible danger of skidding, throwing, bursting, or puncturing tires. Severe rough usage was given them, and at the end of the specified time they were accepted, paid for, and the **Walker Auto Tire Band Co.** was permitted to take the above photograph. All concerned were as tickled as a boy with a new pair of red topped boots.



If you are tired of tire troubles and tire expense and want to get real enjoyment out of automobiling, equip your machine with **Walker Auto Tire Bands** and your troubles are over. They add power and beauty to the machine, reduce friction heat 50%, prevent cuts, bursts and punctures, do not spin in mud or sand, will hold like grim death to a smooth surface and will assist in climbing any elevation an automobile could be supposed to reach. Prices and descriptive circular mailed on application.

WALKER AUTO TIRE BAND CO. (Incorporated),

18-20-22-24 S. EAST ST., INDIANAPOLIS, IND.

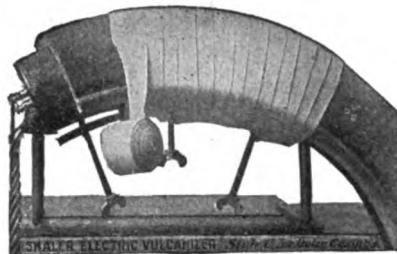
Western Branch, L. L. Walker, Table Rock, Neb.

SHALER ELECTRIC VULCANIZERS

DULUTH, MINN., Oct. 28, 1908.
C. A. SHALER CO., WAUPUN, WIS.:

Gentlemen—Your vulcanizer is in use every hour, and we have found it to be by far the best that we have ever used. We have discarded two other makes. The Shaler is O. K.

Yours very truly,
RUSSELL MOTOR CO.



A Type C and a Type B "SHALER" make the most complete garage equipment on the market, and will do any work that is practical on any Auto Tire. Heat is generated by simply attaching the city current, and about ¼ cent's worth of current is used in an hour. It takes only a few minutes to get the right heat, which is maintained automatically.

C. A. SHALER CO., Mfrs., WAUPUN, WIS., U. S. A.

"Akron" Repair Kit

Makes the repair permanent, as it reproduces the same effect as vulcanization. The acid cures the cement to the rubber or part to be repaired, which makes it one solid piece of rubber and impossible to separate.



"Akron" Repair Kit
Price, Delivered, \$1.00

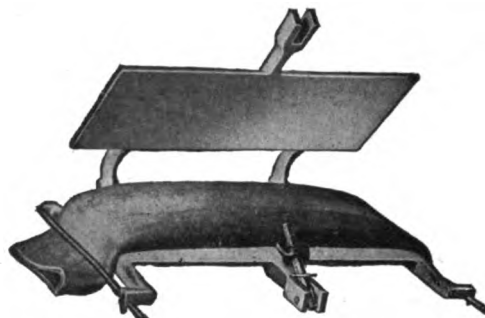
This Pure Aluminum Vise is intended to be used in applying patches to inner tubes. It holds the patches firmly in place while the rubber cement is setting and vulcanizing.

It prevents the patch edges from curling and positively assures you of a permanent repair to your inner tube. For use with any size inner tube. Small, light and strong. An absolute necessity for every automobile owner.

We also make the

"Akron" Inside Repair Patch,
"Akron" Tire Boot,
Motor Cycle Boots and Patches,
Top Dressing for Autos.

Ask your dealer, or write direct. We make regular inner tube patches, six sizes.



"Hold Tight" Aluminum Vise
For Inner Tube Patching,
Price, Delivered, \$1.25

THE EMPIRE MANUFACTURING COMPANY, 20 Beech St., Akron, Ohio

"Kulpe" Pat. Ball Bearings.

Steel } Balls.
Brass }

¼ Inch Shaft and Up.
No Fitting. Just Push Them On.
10 Cents in Stamps for Sample.

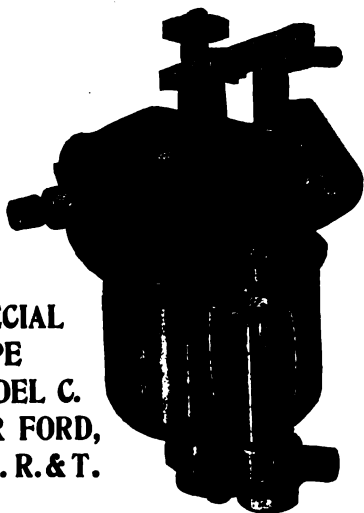
PRESSED STEEL MFG. CO.,
454 The Bourse, Phila., Pa.

MENDENHALL'S ROAD MAPS

MAPS AND GUIDES FOR AUTOMOBILISTS.

SEND FOR CATALOGUE
O. S. MENDENHALL, PUB.,
39 Opera Pl., Cincinnati, O.

SPECIAL TYPE MODEL C. FOR FORD, S. N. R. & T.



This, a type made specially for this car, is easily attached and adjusted; no fitting required. Gives more power. Finest throttle control at all speeds. Saves gasoline and runs engine cooler. Is giving satisfaction in cases where four different makes had been tried before ours. Low in price, but high in quality. Satisfaction guaranteed or price refunded. Send for 1909 catalog.

HEITGER CARBURETER CO.
INDIANAPOLIS, IND.
212 WEST SOUTH ST.

A BATTERY BARGAIN

A 6 Volt, 60 Ampere Storage Battery

GUARANTEED
1 YEAR

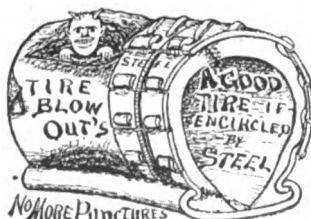
\$9.75

Selling regularly at
\$22.50

Special discount
for quantity order.

S. BREAKSTONE
900 Fisher Bldg.
CHICAGO, ILL.

PROTECT YOUR NEW TIRES. REPAIR THE OLD ONES.

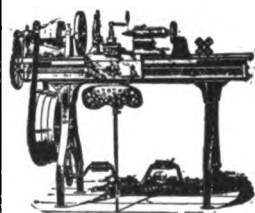


Tires
Will Last
Forever

Steel Link
Bands

Hooks to
Rim

You can fix Blowouts quick. If tire is completely covered by these clamps you cannot have Blowouts, Punctures, Rim Cuts or Wearing off of tire. (Any old tire is good. How can it get away if encircled by steel?) As flexible as ever. Anti Skid.
KIMBALL TIRE CASE CO., 174 Broadway, Council Bluffs, Ia.
Agency for Indiana, 417 Mass Ave., Indianapolis.



THE BARNES LATHES

9' swing
11' swing
13' swing

For Repair Work our No. 13 Lathe is right; has 13' swing, auto cross feed, length of beds from 5 to 10 feet long; furnished with counter-shaft or foot-power.

SEND FOR LATHE CATALOG.

W. F. & JOHN BARNES CO.

206 Ruby St., - - - Rockford, Ill.

GASOLINE STORAGE UNDERGROUND OUTFITS

\$12.50, \$25.00, \$35.00 and up.

GOOD GOODS. LOW PRICES.

LUBRICATING OIL TANKS ALSO.

\$3.50, \$5.25, \$6.50, \$10.00 and up.

Cabinets, \$15.75 to \$100.00.

Oily Waste Cans, meeting insurance requirements.

Accurate Measures, and good funnels.

Kamp Kook's Kits that please tourists.

Ask Your Dealer. Send for Catalogue.

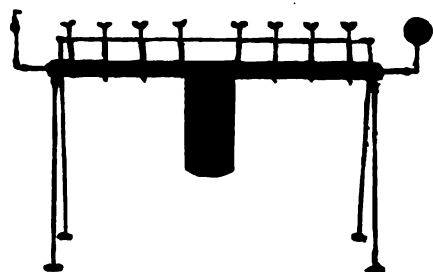
MANUFACTURERS SINCE 1869.

F. CORTEZ WILSON & CO.,

247 Lake Street, Chicago, Ill.

Please mention the Automobile Dealer and Repairer when writing to advertisers.

MILLER'S INNER TUBE VULCANIZER.



Has a tube plate 54 in. long and 4 in. wide with plain surface highly polished, complete with stand, 12 fine boiler, gas or gasoline burner, water glass, pop valve, steam gauge, 8 clamps and two molds for curing the treads of casings, price \$30.00 Tube plate only with steam gauge and 6 clamps, price \$10.00.

We also manufacture various other vulcanizers. No. 1 and No. 2 adjustable sectional vulcanizers, complete with boiler, \$35.00 each. Bicycle vulcanizers, \$7.50; Motor cycle vulcanizers, \$12.50; Tread Rollers, \$12.00; Kettles, \$115.00; Power wrapping machines,

\$175.00 each. Also special round molds with flush joints for splicing inner tubes. We do all kinds of tire repairing and carry a large stock of tires at reasonable prices. If further interested in vulcanizers write for catalog and special proposition.

CHAS. E. MILLER, Anderson, Ind.



60% to 70% off 1909 Guaranteed TIRES AND INNERTUBES

Biggest cut ever made on first class, fresh stock. All strictly first quality, fully guaranteed 1908 product of the most prominent manufacturers.

We absolutely guarantee them worth double the price asked for them. The extraordinary low figures which we are selling them at will move our limited stock quickly, and we advise you to mail your order now. **DO NOT DELAY.**

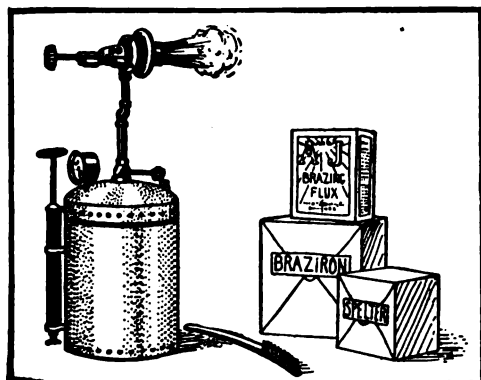
Casings and tubes to fit any Clincher or Universal Rim.

Size	Casing		Tube	
	Reg. Price	Our Price	Reg. Price	Our Price
28x2 1/2	\$12.50	\$7.00	\$3.20	\$2.50
28x3	14.65	10.50	3.65	2.75
28x3 1/2	21.55	12.00	5.00	3.50
30x3 1/2	23.15	15.00	5.30	3.50
30x3	15.70	12.00	3.90	3.15
30x3 1/2	18.25	8.50	3.25	2.75
30x4	21.80	17.50	6.40	4.75
32x3	16.80	10.50	4.15	3.25
32x3 1/2	24.60	15.00	5.60	3.50
32x4	38.65	18.00	6.85	5.00
34x3	17.90	9.25	4.45	3.50
34x3 1/2	26.80	16.00	5.95	4.25
34x4	36.00	20.00	7.20	5.00
34x4 1/2	45.65	20.00	8.30	6.00
34x5	56.20	20.00	10.50	6.50
36x3 1/2	29.05	12.00	6.25	4.25
36x4	38.35	18.50	7.55	6.00
36x4 1/2	48.35	20.00	9.40	6.75
36x5	59.45	22.50	11.05	7.00

WRITE FOR COMPLETE LIST.

Write for prices on any make, size or style. We guarantee our prices lower than any dealer in the United States.

CAST IRON BRAZING



Is Entirely Practical.
Save Loss and Delay.
Increase Your Business.
Good Profits.

We supply complete outfits, or materials only, as desired.

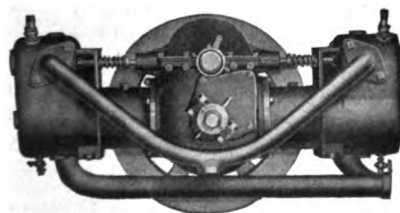
Write for full information.

THE A. & J. MFG. CO.,
18 West Randolph St., Chicago, Ill.

The Beilfuss Double Opposed Motor

Makes a hit wherever used on account of its compactness.

Can be placed in any car from the small Olds Runabout to the larger sized cars.



Made in two sizes:
10-12 H. H. P. and 18-20 H. P.
Water Cooled.

Write to day for Circular and Prices. Simplest and Strongest Motor Built.

Beilfuss Motor Co.
LANSING, MICH.

Please mention the Auto Dealer and Repairer

Eastern Self-Measuring Pump

Our 1907 Model, shown herewith, will quickly pay for itself in any garage.

**Convenience,
Economy,
Safety.**

Not one drop of Gasoline wasted.

**Gasoline Tanks,
Pumps,
Complete
Storage
Outfits.**

Get full information by writing to

Eastern Oil Tank Co.
Lowell, Mass., U. S. A.



Extraordinary Bargain.

\$75.00 COMBINATION SPEEDOMETER

Complete with all fittings for any make car. **\$19.00**

This is not a so-called low priced instrument to meet the requirements of the low priced cars, but a high grade full jewel expensive speedometer built for the best cars made.

1909 MODEL RIVERSIDE SPEEDOMETER

shows speed from 1 to 60 miles per hour. Trip odometer registers up to 100 miles. Season odometer registers up to 10,000 miles. Maximum hand indicates highest speed attained and can be reset at will. This instrument has a 4-inch dial, and is guaranteed for one year. Illustration and descriptive matter sent upon request.

Remember this is a chance of a lifetime, and we only have a limited quantity. Send in your order NOW. Give make and model of your car.

TERMS: Cash with order, or C. O. D. If order is accompanied by 10% deposit. Money refunded if found unsatisfactory.

EXCELSIOR TIRE CO., 1775 B'way, New York.

Marvel Hand Cleaner

An excellent thing for removing grease, dirt, etc., from the hands. Contains no acid or other injurious substances. Price, 10c. per can. Discount to dealers.

HERBERT E. BURLINGAME, Distributor
53 Redwing St., Providence, R. I.

CAST IRON BRAZING easy with UNIVERSAL FLUXINE

You can solder cracked water jackets easy with **UNIVERSAL SOLDERING FLUID.**

Booklet.

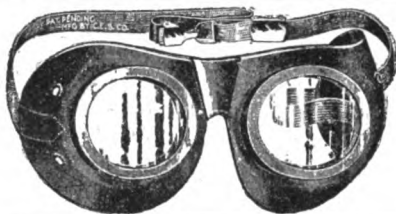
Universal Fluxine Co., Urbana, Ohio

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CHICAGO

From \$3.00 to \$8.00
per dozen.

Nothing like it on the market.

**RUBBER GOGGLES**

Fitted with Smoked, Clear, Blue, Green
or Amber Lenses.
Ask your jobber for same.

MANUFACTURED BY
CHICAGO EYE SHIELD CO., 149 Clinton St., Chicago, Ill.

**THE BUFFALO ELECTRIC VULCANIZER**

\$10.00

Will enable you to REPAIR YOUR OWN TIRES.
THREE TIMES THE LIFE.

A NECESSITY FOR EVERY AUTO OWNER.

\$10.00

FREE

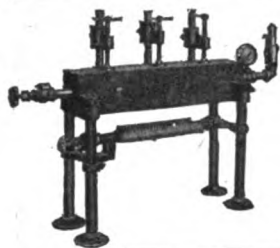
Send for our Booklet "TIRE TROUBLES," with description of Vulcanizer, to-day.

BUFFALO ELECTRIC VULCANIZER CO.,
322 ERIE CO. BANK BLDG., BUFFALO, N. Y.

Thermoid**BRAKE BAND LINING**

WEARS INDEFINITELY
SOLD BY ALL FIRST CLASS DEALERS

Manufactured by TRENTON RUBBER MFG. CO., Trenton, N. J.

**The "Boilerless" Steam Vulcanizer**

NEWEST RELATIVE OF THE "EXCELSIOR."

Underneath the square semi-steel body is fitted our special gas burner, thus doing entirely away with boiler for inner tube work.

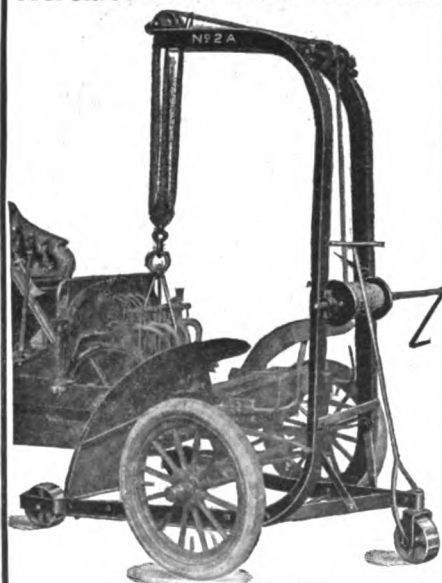
Furnished complete with steam gauge, safety valve, filling valve, air cock, and our well-known quick acting clamps.

LOW COST.

HIGH SATISFACTION.

Immediate Shipment.

WISHART-BURGE MACHINE WORKS,
64 66 SOUTH CANAL STREET, CHICAGO, ILL.

Hercules Portable Crane Hoist

Patented December 19, 1905

See how easy it does it. Fills the bill for Automobile Factory and Garage Crane. Many of them using it. You should. Send for descriptive circular.

WILLIAM S. NICHOLS, Hoosic Falls, N. Y.

HOW MUCH DID IT COST YOU

last year for inner tube punctures? A great deal, didn't it?

Why not save all this expense by carrying an

M. & M. QUICK REPAIR OUTFIT in your tool kit.

Repairs made anywhere—on the road or at home, and you don't need to be an expert to use it. Just follow directions and you will be surprised how easy repairs can be made that have been costing you from 50c. to \$2.00. With

each outfit you can make about \$20.00 worth of repairs. Start now by curtailing expenses, and repair your own punctures.

IMITATIONS are many, but they fail to do the work. Insist on M. & M. If your dealer does not carry it in stock, send his name and

\$1.00 For Our Outfit Prepaid.

Manufactured by

THE M. & M. MFG. CO.,

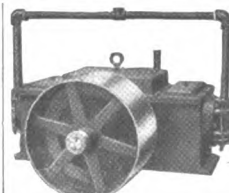
142 CARROLL ST., AKRON, OHIO.

**THE CLIMAX AIR COOLED MOTORS**

are the best automobile motors out. Guaranteed forever against defective material and workmanship. Let us tell you all about them.

Write at once for Catalogue.

CLIMAX ELECTRIC WORKS, New Salem, Mass.

**AIR COMPRESSORS**

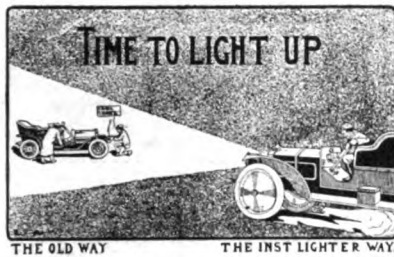
Patented

WATER-COOLED GARAGE COMPRESSOR
Weight 200 lbs., a real machine, not a toy.

Also other sizes.

Send for Descriptive Circular and Price List
Geo. S. Comstock
Mechanicsburg, Pa.

Please mention the Automobile Dealer and Repairer when writing to advertisers.



Light

Your Gas Lamps by turning a gas cock and an electric switch, both located on the dash of your car where you can reach them without stopping or

GETTING OUT

PATENTS PENDING.

GET THE INST LIGHTER

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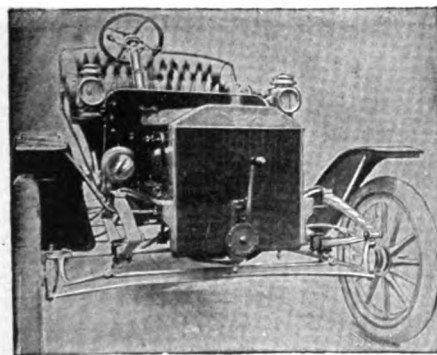
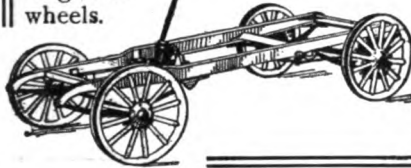
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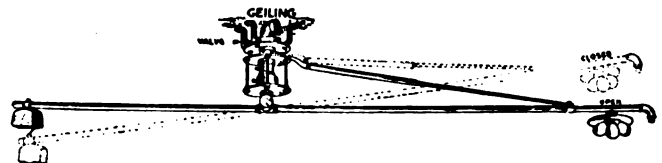
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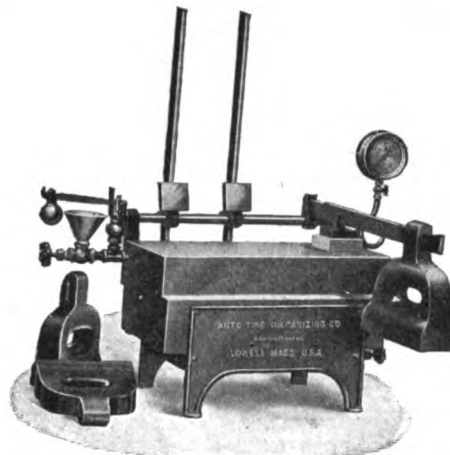
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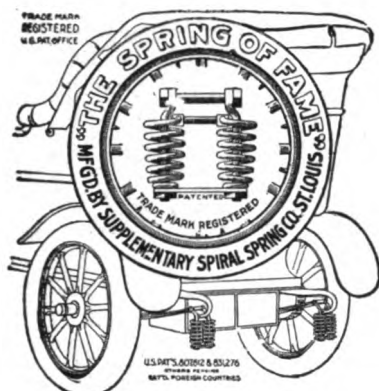
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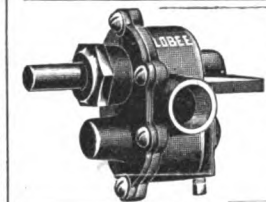
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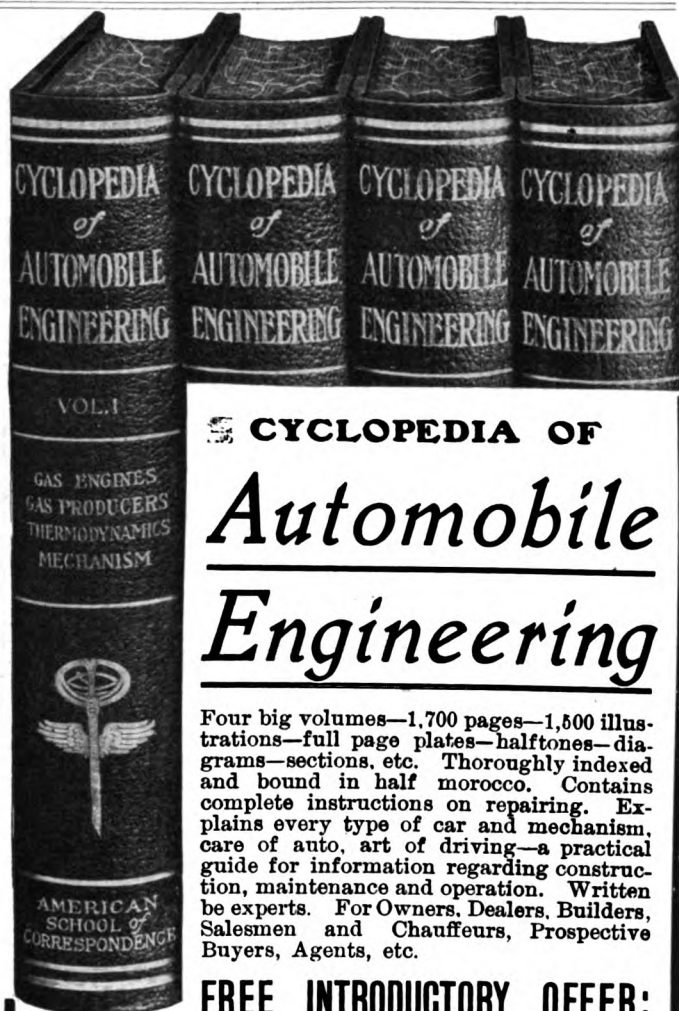
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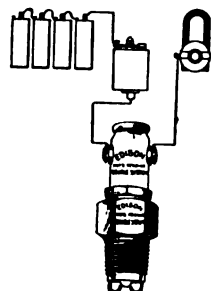
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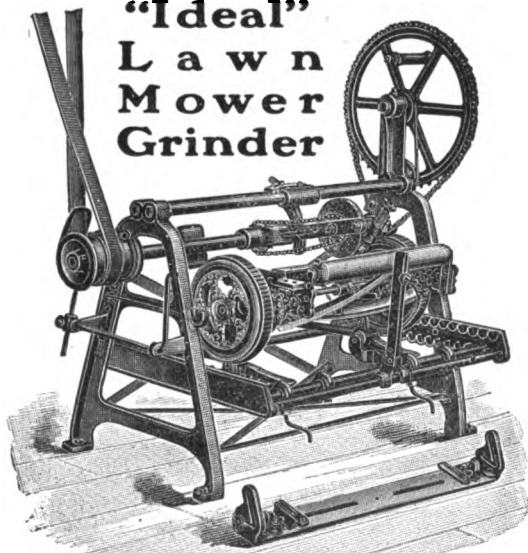
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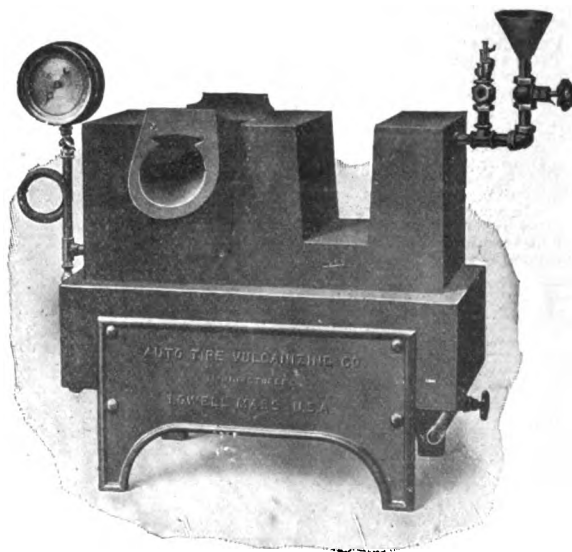
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Made in all gas capacities
Viz.: $\frac{1}{8}$, $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$ and 1 foot



Alco Type No. 1



Alco Type No. 80



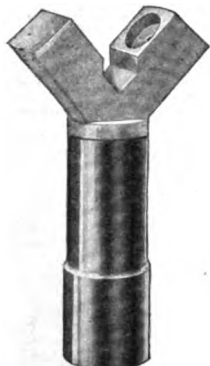
Alco Style No. 7



Alco DeLuxo
Genuine German Stone
Rich Nickel Finish
Pat. Dec. 24, 1907



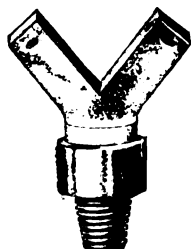
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Alco Style No. 4



Alco Type 8



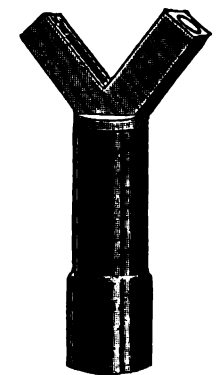
Alco 120



Bike Tip



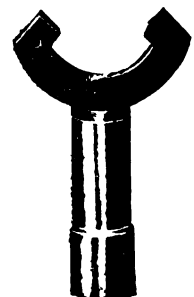
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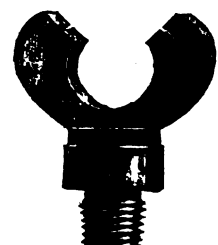
X-Ray



Alco 100 (No Name)



Pony Burner



Alco No. 17

Dealers' Guide to Burnerville.

TEAR OUT AND SAVE.

Mr. Dealer: Make a mark here..... You want to come back to read this page!

Do you ever stop to consider the importance of that little unit, so essential in night driving—the Acetylene Gas Burner? The life and safety of the passengers and safety of the car itself, depend on the reliable operation of this insignificant looking little part. All coons and most burners look alike, but there are differences in both coons and burners (living amidst the tall timbers and hot lava, in the heart of the Sunny South, we may be expected to know about both).

When a new car or a new lamp comes to you from the manufacturer, what burner do you find therein? In most you will find some style of an Alco-made burner. Now what does that prove or mean to you?

Don't you suppose these lamp manufacturers have made exhaustive tests in their own laboratories, on every acetylene burner known to the art? Don't you know that they selected the best, because the operation and satisfaction of a lamp depend on the working of the burner?

Do you imagine they would jeopardize either the operation or the reputation of their own product by using burners inferior in candle power, or life?

No—you must admit, when you stop to think it over, that the lamp maker has too much at stake—hence you may rightly conclude that what is best for him is best for you and your trade. That's Alco.

We supply the largest and most critical lamp makers their entire requirements—not forgetting the smaller but equally discriminating ones, either.

There is an Alco style of burner for every requirement. Alco burners are made in all shapes and mountings for which there is a demand, whether for American or foreign lamps. Whatever the style or price, every individual Alco-made burner is tested under gas flame by four men before packing. This insures perfect alignment. All leading styles are made of the justly celebrated Bavarian Steatite, or German Lava.

We carry 200,000 auto lamp burners in stock, shipping all orders within an hour of receipt. All styles in all gas capacities (standard is $\frac{1}{8}$ and $\frac{1}{4}$ ft. per hour).

If there is any important Auto Jobber who does not carry Alco burners, we will send you a dozen free for his name.

Order from your jobber—specify Alco burners and see that you get them—their use will save you money, as the inducement is in Price as well as quality.

AMERICAN LAVA CORPORATION, Chattanooga, Tenn.

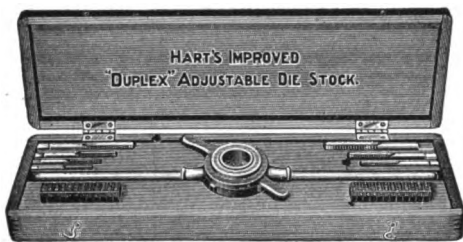
The only concern that RESISTED and SUCCESSFULLY PREVENTED a monopoly and exorbitant prices on burners.

TEAR OUT THIS PAGE and save for future reference. Paste it on your wall so you will know what style to mention when ordering from the Jobber.

Please mention the Automobile Dealer and Repairer when writing to advertisers.

SHARP DIES

Are what are needed to cut good threads, and you can always have them if you use a



"DUPLEX" Die Stock Set

The dies in these sets are easier to sharpen than a knife; this fact enables you to get the full wear out of them. A. L. A. M. and other standards of threads.

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Union Welding Company

Address Nearest Office

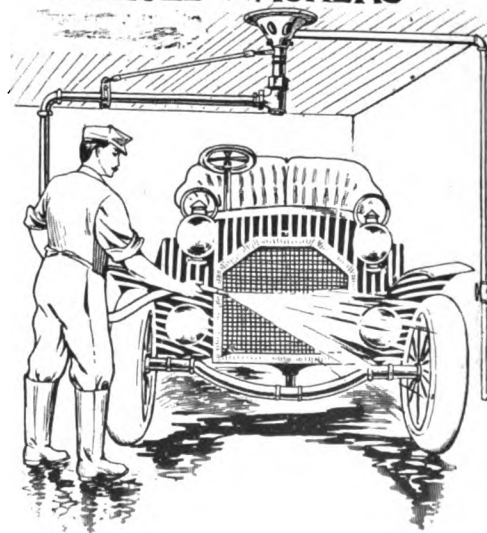
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Automobile Dealer and Repairer

A PRACTICAL JOURNAL EXCLUSIVELY FOR THESE INTERESTS.

VOL. VII, No. 4.

NEW YORK, JUNE, 1909.

Price { 10c. PER COPY
\$1.00 PER YEAR

CAR SEATS.

How to Repair, Construct and Fit Them on Runabouts and Touring Cars.

With this illustrated article we intend to make automobile repairers acquainted with the different ways employed in the repair shops; how to repair and construct runabout and touring car seats and how to order the bent wood seats. The difficulties in the repair shops are the diversity of work to be done and the variety of stock used in the repair trade. It is impossible for the repair man to keep them on hand

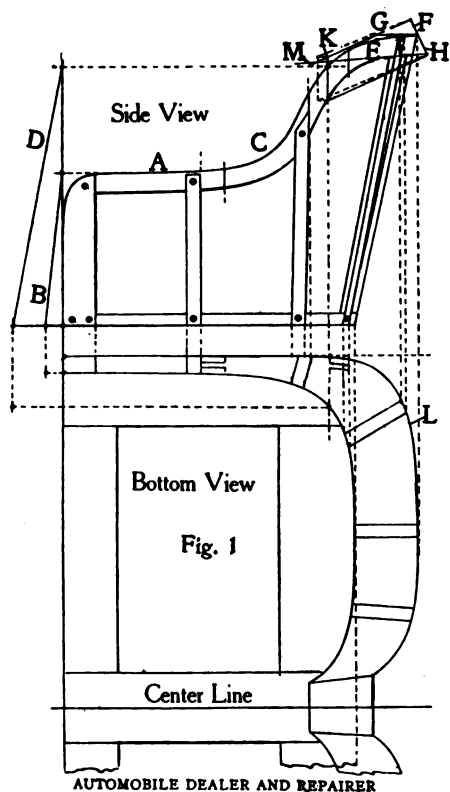


Fig. 1—Side and half bottom view of a touring car seat, showing how to lay out and frame the seat rail.

because the damages and repairs are so varied and the stock used is made by so many manufacturers that the repair man must not only know how to repair the broken and worn out parts but how and from whom to order it and get it quickly. For this reason the first work to be attended to when the auto enters the repair shop is to make notes of all the parts to be replaced and the order is sent off with the next mail with the familiar legend the manufacturers are so well acquainted with since the use of the automobile: "Ship without delay by express all parts as stated." The delay is very seldom in the transit, but the way the order is made out by the repairer, and sometimes the parts as ordered are not kept in stock, but have to be made, and this is generally the case in bent wood seats, because it is impossible for the

manufacturers to keep all kinds of seats of all the various widths and different flares for sides and ends. The order should not only be correct as to dimensions, but should state on what part the dimensions

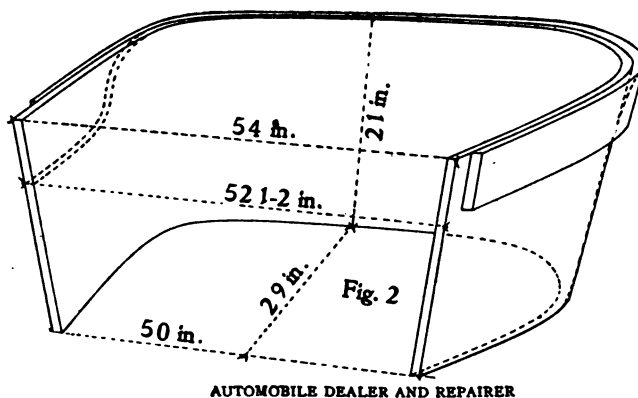


Fig. 2—Single full size seat with one built-up piece only on the outside.

are taken. In regard to shapes the best is to use paper patterns; a good way is also to mark all the flares on paper and full size.

THE RUMBLE SEAT.

When rumble seats are covered with steel sheets or aluminum they are always framed; that is, the seat frame is made from $\frac{5}{8}$ or $\frac{3}{8}$ inch ash, and the posts, strainers and rails are framed together. The rails are sometimes bent which is far better than the framed rails. Considering the amount of labor used to frame the rails the bent rails are the cheapest, but if the rails are not on hand in the repair shop, framing is

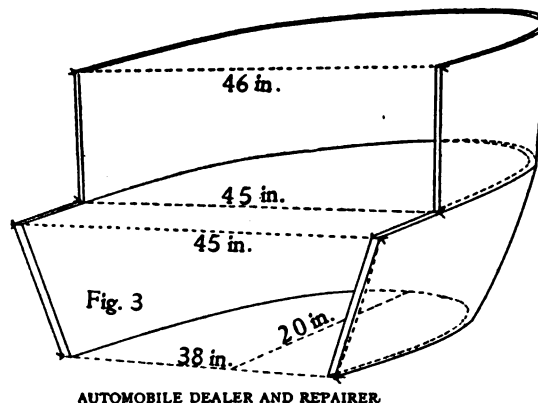
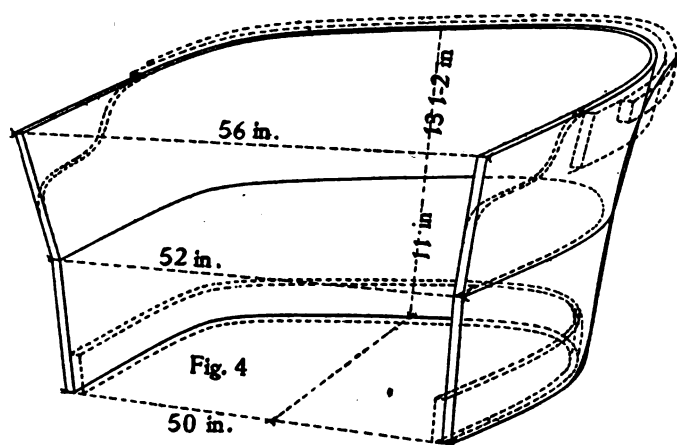


Fig. 3—Narrow auto seat with considerable side flare for the lower part and only a trifle for the upper part. The lower part is made thicker to obtain the swell at the rear and on the sides.

resorted to. The framed rails are generally made out of three pieces, but when framed of five pieces there is less cross grain. In many small repair shops to hammer the steel or aluminum sheets to shape is a new thing and mechanics to do it are difficult to find, and wood panels are resorted to.

The four rumble illustrations as framed are covered either with steel sheet, aluminum or wood panels,

and on all such seats the grain of the wood is running up and down, and the joints are always on the center of the strainers to which they are glued. The panels bend very easily around the corners and do not need to be very wide as a joint can be made at each



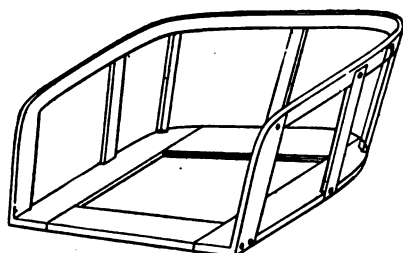
AUTOMOBILE DEALER AND REPAIRER

Fig. 4—Seat made in two parts showing how they are blocked or built up from the outside and inside to obtain the shapes.

strainer. All such panels are canvassed between the strainers and as the canvas will draw the panels inward in drying they should be forced somewhat by bending them a little rounder than the seat and then forcing the panel toward the joints and toward the seat frame and rail. Most of these small seats are made plain on outside surfaces, but when molded the moldings are all glued and bradded on.

TOURING CAR SEATS.

The touring car seats are somewhat similar to rumble seats, except the construction is more complicated on account of their shape as shown on the side view. These seats are built for one or two to sit on. The one seating two is either built without a division or with one in the center of the seat. This division is either low or high, curved, straight, or horizontal and straight. The seats built for two with a framed division are known as twin seats of which Fig. 1 shows



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Rumble seat showing frame work and rail.

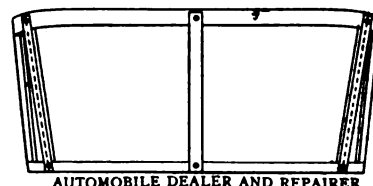
one-half of the twin seat, and the other half is as illustrated and divided with a center line. The up and down surfaces are straight and only the rear corners are full rounded. The construction of the rail on account of raise toward the rear on side view makes the framing exceedingly difficult. The rumble seat rail was easy to frame because the top surface is straight, but on touring cars the rail is curved both ways.

The easiest way out of this difficulty is to frame the rail out of five pieces as follows: Saw out pieces A and bevel after B. Saw out pieces C as on side view and bevel front after B, and the rear end after D. Saw out rail E and use a plank 2½ inches thick

and square as indicated at F. Remove the timber to a horizontal line as shown on F. Remove corner on H to obtain the back flare; cut vertical surface for joint on K but lengthen to dotted line otherwise it will be too short. This piece must be shaped to suit its curved line L on the bottom view. This piece when shaped on the outside surface must have the back flare on H, and on the joint K it must be beveled after its line D, and the curve after the line L. At the car end of the piece C, curve after L and bevel after D. Now you can gauge all the tenons from the outside and remove all the superfluous timber from the inside. Another way is to use 1¼-inch thick lumber, the same to shape as the curve on L. Glue a piece under it the shape as on the outside view, make joint at M and bevel the rear end and sides as stated before. This makes a joint, but as the tenon on the piece C goes partly in the rear piece it combines the two and makes it plain for the repairer.

BENT SEATS.

All bent seats when right, otherwise, except when too wide or too narrow, are spliced. When too wide, say, 1½ inches, they are cut in the center of the seat, making a 1½-inch long joint. Many prefer a feather edge and screw from the inside, but as they are ugly to fit, gauged joints are preferred by repairers, because feather edge or beveled joints will slip a trifle in glueing. The gauged joints half on the inside and



AUTOMOBILE DEALER AND REPAIRER

Rear view of the rumble seat, showing the frame, rail and strainers

the other half on the outside can be made so that the screws draw against the joints in glueing. When the seats are only ½ or ¾ inches too wide, they are spliced with a tenon and drawn up to the joints with screws as explained before, but with an extra piece from the inside. It cannot be clamped and must be drawn up with screws. Another way is, if the seat is only ¾ to ¾ inches too wide to cut out to the exact width. Now divide the thickness of the seat in two parts, and cut out the inner part on both half seats, two inches long. Fit a piece the whole height of the seat pieces 4 inches long and glue them to one side with clamps. When thoroughly dry fit the other part to it, glue and draw the joints up with wood screws.

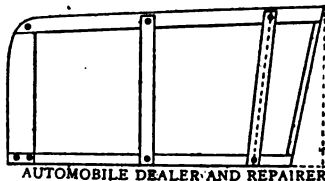
When the seat is not wide enough, a piece is fitted into it to lengthen it out and the joints are made as explained before.

VARIOUS SHAPES OF BENT SEATS.

Seats are bent with side flares by upsetting the lower part, but the rear is produced by cutting the lower edge; the more flare the wider the seat piece must be. After the seat piece is bent, and the repairer wants more or less flare he puts the seat on a straight board, lifts the front or rear edge, puts pieces under it until the rear flare is what is needed, takes a block the height needed and shifts the block on outside and inside edge of seat and makes pencil lines all around. This is the most practical and simplest way to make the seat fit to the seat frame or body surface.

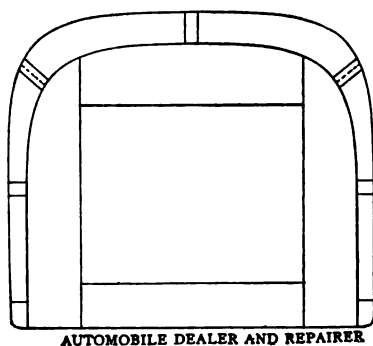
All seats vary in widths, flares and heights and many vary in shape. Take for instance Fig. 2, com-

posed of one single bent piece, for a full size auto seat with another fitted against it on the upper part. When the seat is straight the upper extra piece is not needed, but if a curve is needed, as shown by dotted line on upper right hand side, another piece must be glued against it. This is called in practice blocking up the seat. Generally the sides of the seats do not need blocking and part of the front of the seat is cut away as shown by the dotted line. On left side of the seat Fig. 2 we made the outer piece longer to show to better advantage. Now note Fig. 3. This seat is



Side view of the rumble seat, showing seat frame, rail, front post and strainers

composed of two bent pieces, upper and lower. The upper one fitted to the lower one, and therefore both seats, upper and lower must have the same shape, a difficult thing to do, but the expert wood benders do it. Note the dotted line on the right hand and front edge of the seat, also the rear round edge having side curve. This curve is produced by heavier bendings and by rounding it afterwards. Note Fig. 4, a high seat in two parts, upper and lower. The concave top part produced by two extra outside pieces, and the lower convex part produced by an extra piece. Now note the widths of the upper and lower piece. The upper one has a great deal more flare than the lower to aid the upper concave in connection with the two upper extra pieces, and the lower convex part is aided by less flare and an extra inside piece, but when the two seats are fitted together at the inside joint they



Bottom view of rumble seat, showing seat frame, strainers and outside corners.

fit on the outside edges if bent correctly. The wood bender's art has advanced wonderfully as seen by Fig. 4.

It will be evident, judging from Fig. 3 and 4, that dimensions, drawings and descriptions for wood benders are necessary. The drawings as shown in the three illustrations are sufficient. To this add depths and widths as shown. To this add the rear flares when in one bending or amount of flare for the lower seat, and also the amount for the upper seat, and this is most important. You may have a great deal of back flare, and the more you have the more the lower edge of the seat must be cut to obtain the flare. The result is that the seat will be too low. A description of the seat besides the above will produce satisfactory results and be a time saver.

ONE YEAR WITH A CAR.

A Physician Gives His Experience with Running a Car a Single Year.

A Minnesota physician has made a rather carefully prepared summary of the cost of running his car for a single year, and had the result printed in the Medical Brief. It will be at once noted that the car was not an average good one, and quite likely the physician himself lacked the mechanical qualities necessary to secure economical running. But the result is interesting and instructive nevertheless; although, of course, it does not do the automobile what may be called average justice. But here follows his remarks and record:

"Endurance runs, trials of speed, the tester's observations at the factory, extended use under special, favorable conditions, are of little real value to the doctor who wants to buy a car to do his conveying, and do it satisfactory to his ideas of time and expense. The observation must be from outward toward the manufacturer, and not from the manufacturer's anxious-to-sell point of view. There are very few manufacturers who will admit that their product is not the very best in the world for a doctor's use, and a doctor's use of an automobile is the most severe and fault-discovering gauntlet that a car can run. With an experience of eleven years I have become critical, and records for the data in this article were kept very carefully as a means of acquiring valuable information.

"The automobile which I used for the year 1908 in my practice as a country physician is a well known make of runabout. It is a two-cylinder, 14 horsepower, four cycle, water-cooled, seats for two, single chain-driven, gasoline car, weighing two thousand pounds ready to use, including myself. The manufacture of this machine has been discontinued because of inherent faults uncovered by one year's actual use. The weight is much more than that given by some manufacturers, but these little fibs are so common that much of the expensive advertising of automobiles is becoming "fiction" in the wise buyer's opinion. The heavy tire expense per mile was due to the fact that the tires were not heavy enough for a two-thousand-pound load. The tires were Fisk, bolted on, 30x3½, which are very good tires, but the special nature of them, and the inconvenience of obtaining them, and the extra expense due to their monopoly of this type of tire, made them expensive and undesirable.

"The clearance between the rear axle sprocket-box and the ground was only eight inches, not at all sufficient for the exigencies of ordinary country travel. The engine of this car was slung up from beneath, rendering it very laborious to remove, and difficult to get at. The pistons were not removable through the crank case, and were only to be taken out by dissembling almost the entire engine and part of the transmission. The valves were almost as difficult to reach. The hermaphrodite system of lubrication, part splash, partly gravity, part crank case pressure, and part chance, made this important feature of motor action a constant source of worry. The engine in starting, usually fired only in the front cylinder, owing to the excess of oil thrown into the rear cylinder by the direction of the revolution of the crank shaft. The cooling system was not adequate to properly care for the cylinders during one hour's use of low gear. The numerous wearing surfaces of the worm and nut

steering gear soon resulted in inavoidable back splash of such proportions that the machine was dangerously slow in answering the guiding hand. This was happily remedied, however, by using coiled springs to constantly exert their force toward keeping the front wheels in a straight-away position.

"Notwithstanding these plainly criticised faults, the machine proved to be a 'car of steady service' in my hands, and carried me through 209 separate trips, to along 1882 miles, during the portions of the year when it was possible to use the machine at all. These trips were made at all times of day or night over roads that would not usually be traveled for pleasure, and sometimes in storms of rain and sloughs of mud.

"The following data are taken from my records of the year:

Number of days during the year when weather conditions and mud or snow rendered use of the automobile impossible, 69.

Number of times pulled out of mudholes by farmers, 6.

Number of times pulled home by horses because of breakdown, 4.

Abandoned the machine in disgust, once.

Marooned on the road from lack of gasoline, once.

Started out and turned back, twice.

RUNNING EXPENSES.

183 gallons gasoline, at 20 cents per gallon....	\$36.60
Fourteen gallons lubricating oil at 70 cents....	9.80
Twenty-five pounds hard grease at 6 cents....	1.50
Twenty-two pounds carbide at 10 cents	2.20
Six gallons kerosene oil at 15 cents90
Five gallons wood alcohol	4.00
	<hr/>
	\$55.00

REPAIRS FROM WEAR.

Two 30x3½ Fisk, bolted on tires complete....	\$101.30
Two inner tubes extra	14.00
One new chain and six repair links	10.50
One connecting rod bearing	2.50
Six piston rings at 50 cents and express.....	4.00
Seven new spark plugs averaging \$1.25	8.75
	<hr/>

REPAIRS FROM BREAKAGE.

	\$151.05
One rear axle, express and drayage	\$67.40
One front spring	4.25
One new Idler cam gear wheel	4.00
One exhaust pipe	3.00
One side lamp by breaking of defective bracket	5.50
Bolts, screws, cotter pins and nuts	2.50
One starting crank	3.25
Glass for gas lamp and two gas bags.....	1.75
	<hr/>
	\$91.65

HIRED LABOR.

Overhauling engine twice	\$18.00
Tire repairing and supplies	9.70
Putting in place renewals	8.00
Straightening crank shaft	5.00
Repairing radiator and water pipes	2.60
Anti-recoil straps on rear axle	1.00
Coiled springs on steering gear	2.00
Extra outer bearing on crank shaft	13.50
Washing car seven times	3.50
Horse hire for hauling in	8.00
	<hr/>
	\$71.30

EXTRAS REQUIRED.

Tire chains	\$8.00
Pliers, pipe wrench, jack, auto cover, ammeter,	
funnel, pump gauge, reserve can	21.50
	<hr/>
	\$29.50

Grand total expense, not including numer-

ous hours of work donated by myself..\$398.50

Average expense per trip made, \$1.90.

Average cost per mile traveled, 21 1-6 cents.

Average length of trip, 9 miles.

"I need not tell you that I was much surprised when I found that my expense per mile, not including interest on my investment, was twenty-one and one-sixth cents. After reading in various automobile magazines that such a car required only 'four dollars and two cents' expense of repairs for one year, and that 'my automobile costs me three and one-half cents per mile as total expense,' an estimate made from guesswork mostly, 'my average mile expense has been so far about ten cents,' but these figures are truth-tellers beyond dispute, and they show just where the money went. Dividing up the information a little farther, we find that the tire expense per mile was a little over six cents. Every trip of nine miles cost, for tires, fifty-five cents. Wear repairs cost seventy-two cents for each trip of nine miles. Breakage cost forty-four cents for each trip, and labor cost thirty-five cents for each trip made. In order that we shall make a fair comparison with former horse-vehicle methods of transportation we must now give the automobile certain credits which are due. I can not tell from my books how much time was spent per mile on the road with my automobile, but I think that I am perfectly safe in asserting that my trips were made in one-half the time used formerly with horses. To make a trip of nine miles with the average livery team will take one and one-half hours. The automobile will, then, save three-fourths of one hour on a trip, or one hundred and fifty-six hours' time on the two hundred and nine trips. This time saved is equal to that many extra miles traveled, or twelve and one-half cents per mile livery charge. We can be certain that we save the extra livery charge of twelve and one-half cents per mile, or fifty-six cents per trip or \$117 from the total expense of \$398.50, bringing the more nearly equalized expense down to \$281.50, or to fourteen cents per mile, and yet we should give the automobile some credit for the time which its use has permitted us to have for extra business during business hours.

"This should still further reduce the cost per mile from fourteen cents down to a figure that would allow reasonable pay for the advantage of time saved, or to probably not over ten cents per mile. This, then, would be the proper and equitable figure to use in comparing automobile use with horse-drawn vehicle use.

"The average cost here for livery teams for physician's use is twelve and one-half cents per mile, or two and one-half cents per mile more than the equitable cost of the automobile.

"Besides the advantages mentioned in automobile use, there are others which do not admit of placing an exact figure of value upon. I refer to the prestige or advertising advantage, the personal pleasure to be derived, and the freedom from nervous irritation produced by long trips with a horse-drawn vehicle.

"The up-to-date, four-cylinder, shaft-driven, magneto-pushed, positively-oiled, speedy roadster of 1909

should give a physician very much better results than my experience of last year afforded me, and if he will put supplemental springs and solid rubber tires on his machine he will avoid tire troubles, and still be able to make twenty miles an hour, which is fast enough for any business trip."

ELECTRIC VEHICLES.

Figures Showing the Upkeep Expense for a Victoria Phaeton for Six Months.

At the Boston agency of the Studebaker Automobile Company a complete and careful record has been kept of the upkeep of an electric phaeton, used for purposes of demonstration. The only omissions were interest charge on the first cost, insurance and stabling or housing. The period was for the six months from April to September, 1908. The car was run 3,437 miles on 91 charges, with an average of 37.77 miles per charge. Comparison of the charging times, however, reveals the fact that 18 runs of upward of 50 miles per charge were made, of which one was 60 and one was 62 miles. For the longest run made on April 23, the battery was recharged at a little under 60 miles before the total of 97 miles for the day was completed.

The biggest item of cost is for charging current, which adds up to a total of \$51.16, when figured on the basis of 7½ cents per kilowatt hour. This is an average cost of 60.19 cents per charge, or, considering the average mileage, 1.66 cents per vehicle mile. The washing was taken care of by a man regularly employed on the premises, so that the other items to be considered are those of mechanical upkeep. Battery repairs during the period, amounted to \$6. The mechanism of the motor and running gear, however, was subject to inspection, lubrication and repairs which aggregated exactly \$10.16. Tires, played an important part in the cost, their share being \$42. The repainting of the carriage work cost \$21.40. Exclusive of this amount, the total expenses for maintenance and operation for the period was \$109.32. The grand total, painting included, amounted to \$130.72.

The average gross expense per day is thus 71.82 cents, or an average cost per vehicle mile of 3.80 cents. From this it will appear that the total cost of operating for a year, where the mileage averaged no higher than in the above case, and where highway and grade conditions were about the same and rather above the average, would be not over \$275, allowing liberally for mechanical maintenance. Another important factor is the number of stops encountered, which is responsible for a proportionate increase in current consumption.

The Studebaker Co. express the belief that the figures here given are in no way inconsistent with the performance of hundreds of electrics now in service in various parts of the country. Where the charging is done by means of a rectifier in the private garage or stable of the owner, the cost for current probably be less than

Use For a Steam Car.

An automobile that is attracting considerable attention on the streets of Cleveland at the present time is a steamer, used by a company in that city for the cleaning of residences and business buildings by the vacuum process. The car has a standard White chassis on which is built a special body containing the necessary machinery for the purpose to which it is used. The car, carrying the attendants, is driven to the building to be cleaned, the dynamo is then belted to the driving shaft and current is generated and carried by means of wires to the rooms to be cleaned. In the room is placed the electric motor which operates the vacuum apparatus. This does away with the cumbersome rubber tubing running across the sidewalks into the rooms to be cleaned. As a means of advertisement a set of auto horns is fitted to the car, upon which an operator plays the popular tunes of the day as the car is being driven through the streets. The power plant of the car is particularly well adapted for use where power must be supplied continuously for long periods when the car is in motion, because of the silence and the absence of exhaust, and there is no trouble from overheating.

A Slow Speed Race.

Automobilists early became aware of the difficulties of running a motor car at extremely low speed, but it has remained for the Automobile Club of Corsicana, Texas, to institute a race to show what car could, without once stopping, take the longest time in covering a course. In a series of contests held at the Corsicana fair ground the distinction of winning such an event, which to the inexperienced would at first seem to be a questionable honor, has been attained by J. P. McKinney driving a Franklin motor car. The distance from start to finish was a quarter of a mile, and Mr. McKinney took three hours and fifty and one-half minutes to cover this stretch. The difficulties of the feat are found in throttling down and in the danger of overheating.

Mr. McKinney, with the same car, won another event, an obstacle race, successfully working a passage through a maze of two-yard sticks so set as to make it difficult for a car to pass between them. To this was added the driving of the car directly at two upright sticks and reversing, the winner being the one who could come nearest to touching them without knocking them down.

Life of An Automobile.

That an automobile if properly built will not only give better service than a horse but will give efficient service for a longer time is what Dr. George E. Senkler of St. Paul, Minn., has set out to demonstrate, and he is within a year of scoring his point. He had been using a Franklin motor car in his professional work, and says: "Among physicians here the average useful life of a horse I have found to be between six and seven years. I am convincing many that the car can be made to equal this, but it will take another year to prove it." Dr. Senkler proposes to see how much longer than seven years the car will serve him effectively in his work.

Cars Wanted In Mexico.

It is stated on reliable authority that Mexico is a promising field for the automobile, offering, as it does, many good roads and thousands of miles of picturesque touring country. It is at present awaiting the invasion of the motor car. Many Mexicans are

wealthy and it is but a question of time when gasoline-propelled vehicles will be the fad of the natives, as in other countries. At present a number of American and foreign cars are represented to some extent. Of these there is practically only one European machine handled.

The flag-to-flag endurance run scheduled to start from Denver this summer, with Mexico City as the objective point, is expected to open the eyes of American manufacturers as to the possibilities of the sister republic.

CARTERCAR PROGRESS.

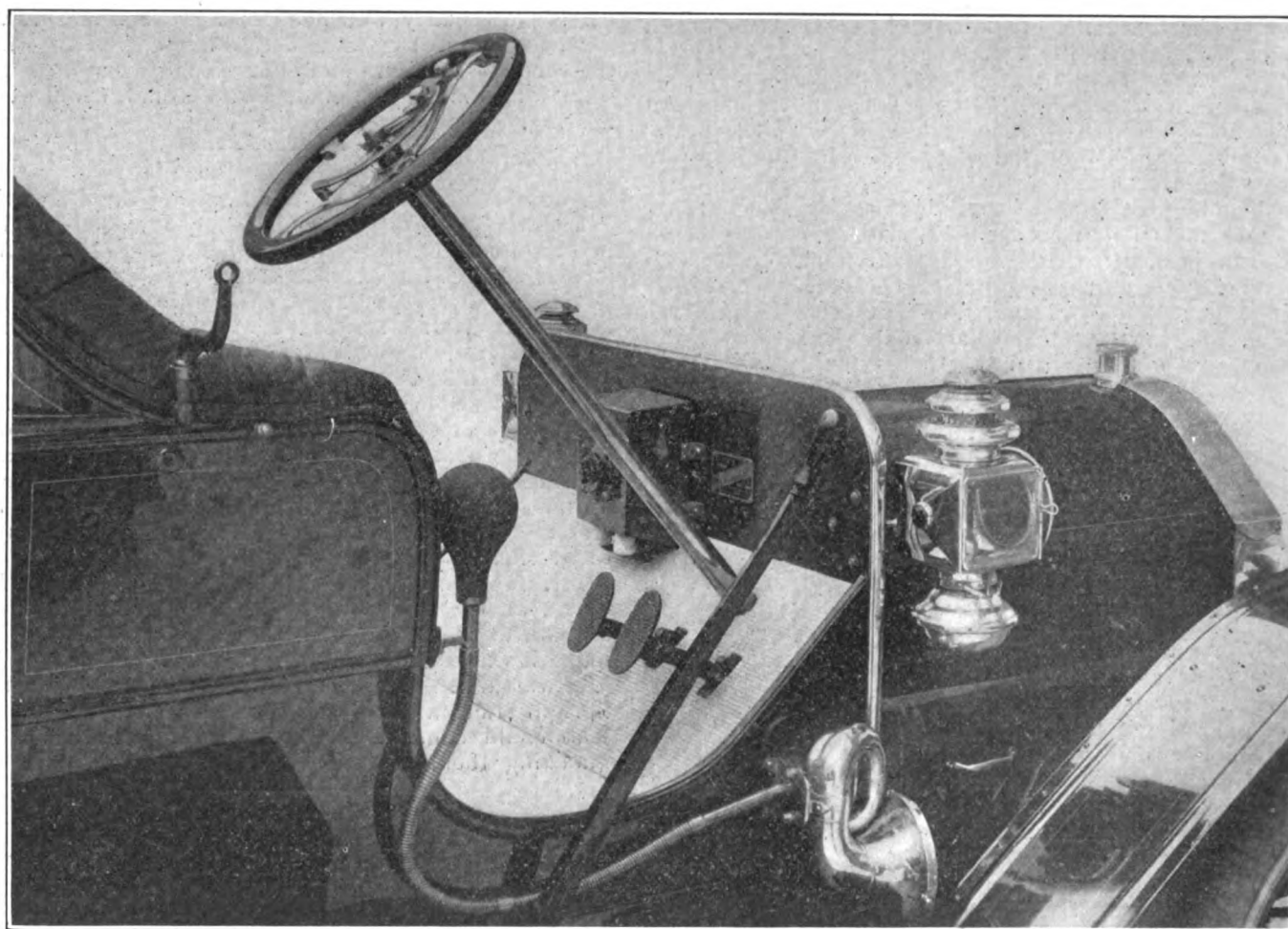
Some of the New Products of This Successful Manufacturing Plant.

Nothing is more interesting to the progressive mind

preceding, and it now has one of the largest manufacturing plants for automobiles in the country at Pontiac, Michigan.

The new model K friction driven runabout is decidedly a winner and has brought forth many flattering compliments from agents and, incidentally, several fat orders. The model G gentleman's roadster is continued with a few refining touches added. A new model H touring car succeeds the present model A. The "Pontiac," a high wheeled friction driven car made at the Pontiac plant, is continued as heretofore.

The location of the new plant is one of the finest in the country. It is at the junction of the Detroit, Grand Haven & Milwaukee and the Michigan Air Line railroads. An electric line also passes the door, making it convenient for visitors. The buildings are of brick and concrete, covering about two acres of ground and are five stories high. The road conditions

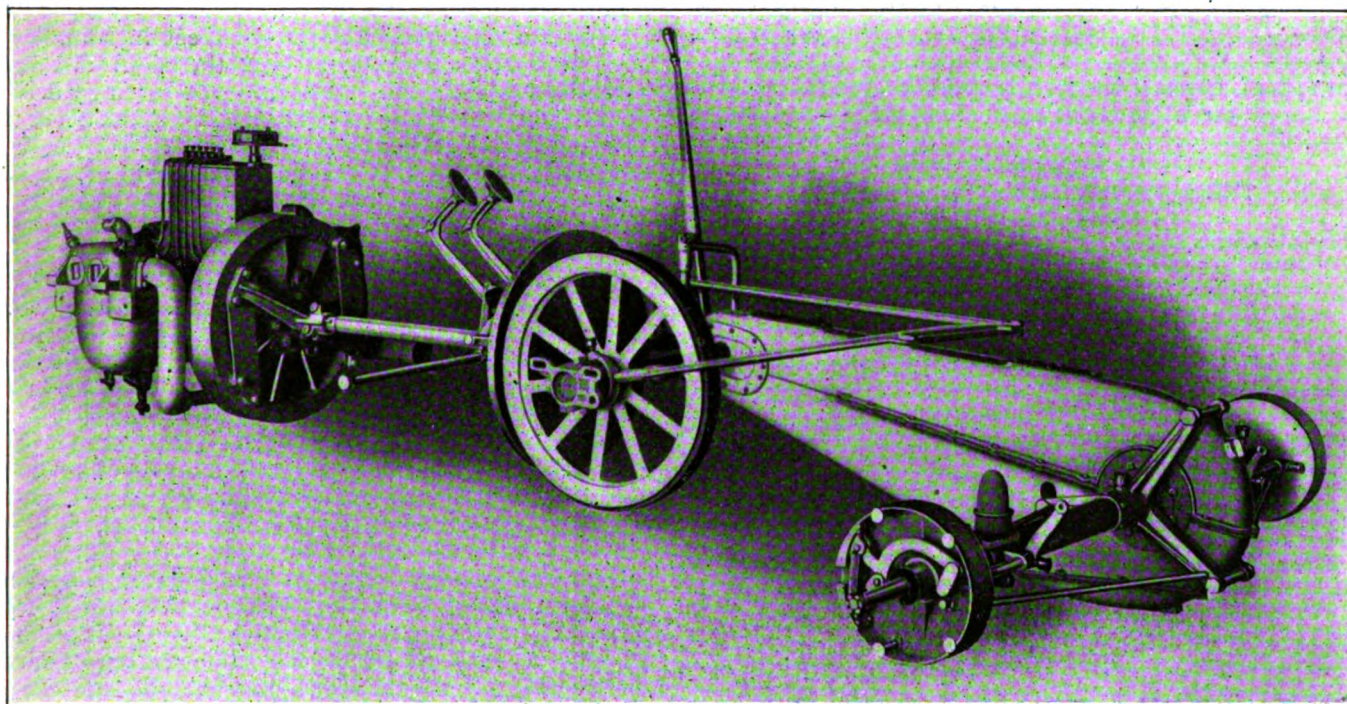


Showing the Cartercar one-lever control and operating parts of the Cartercar.

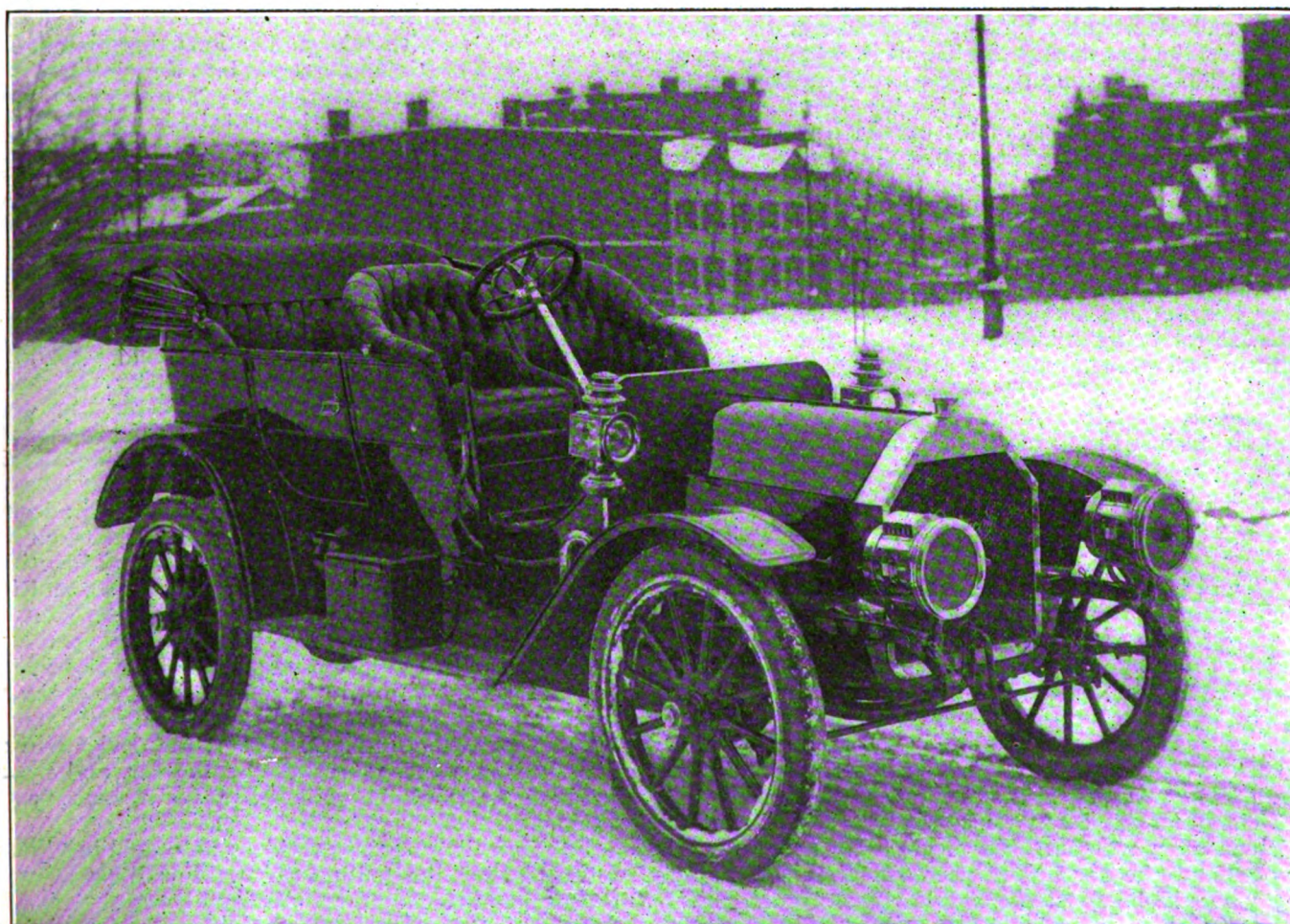
than to note the stumbling blocks that are always placed in the road of the pioneer—the man who blazes the trail for others to follow. When the idea of friction transmission for automobiles was first invented the wisecracks either regarded it with the disapproval of silence or openly opposed it, but its practical value has now been so thoroughly demonstrated that it is no longer under the ban. Cars that use the idea have been so thoroughly tested under all conditions and circumstances that it now needs no defense. Indeed, the Carter car, the most popular as well as the earliest car of the kind to be put on the market, has had remarkable success, the business of the company manufacturing it having almost doubled every year over the year

about Pontiac are ideal the year around for the road tests which the Cartercar people give every machine turned out. There are hills, sand and long straight-away stretches.

have been made to the board of directors.



Showing new connection on the fly wheel, friction transmission, chain-in-oil drive, rear axle and one-lever control of the Cartercar.



Model K, Five Passenger Cartercar, Price \$1,350.

Automobile Dealer and Repairer

A Magazine of condensed and compact information for busy readers.

OFFICIAL ORGAN OF THE NATIONAL RETAIL AUTOMOBILE DEALERS' ASSOCIATION

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ADVERTISING RATES MADE KNOWN ON APPLICATION

NEW YORK, JUNE, 1909.

Missing Numbers—Our readers are requested to remember that it always gives us pleasure to re-send numbers which have gone astray in the mails.

TOO MUCH DARING.

There is too much talk about "daring motor car drivers." It requires no daring whatever to drive a car, and the less daring that is put into the driving the more likely will the driver be to come home safe and sound.

When a man takes out his car for a drive, let him leave his daring at home. He will get along better thus, and if generally followed it will result in the greater popularity and wider use of the automobile.

"Daring" has intruded its reckless and criminal head into the automobile business altogether too much already, and it has had its baneful effect. Horse-racing has become a medium for gambling, golf as an excuse for being thirsty, prize fighting a door to the music hall stage, foot-ball a goal for sluggers, and base ball the safety valve for letting off surplus billingsgate. Let them, if they must. But the automobile is an institution of an altogether different character. The sooner "daring" drivers are eliminated from the use of the automobile the better.

SOUNDING THE HORN.

There is no way by which an automobile driver can be immune from vilification on occasions. If he sounds his horn properly, he is liable to be charged with "ordering everybody to get out of the highway," and with "you think you own the roads, don't you?" If he is a bit chary in sounding the horn, having received many admonitions as aforesaid, he is scolded with, "Why didn't you blow your horn and let some one know you were coming?"

The other day a car was coming up behind a vehicle driven by a woman. Her horse was somewhat nervous, and the car driver naturally thought the best way would be to crawl up slowly and pass quietly. But the woman exclaimed angrily, "Why don't you sound your horn?" The driver explained the situation, saying he had sounded it fifty yards back to warn

her of his approach, but he might as well have been a dog and bayed at the moon.

It is not easy to always be discreet in sounding a horn just often enough, at just the right distances, and just loud and long enough. But carriage drivers should not forget that although it is more agreeable to send a car along when passing a horse, yet it is well understood that if this course be adopted, and accident and injury result, the automobile owner may be called to account for damages.

NOT FAULTLESS.

Although we receive many complimentary words, from our readers for what we are attempting to do in the line of supplying a useful journal for those who are interested in the automobile, we occasionally get those of the other sort, and these are as acrid and complaining as the first named are friendly and good-natured. Although the proportion of commendation to criticism is about one to one hundred, we do not object to this proportion of censure—when it is deserved, and this is usually the case.

And yet, in the words of the poet of aphorisms, "whoever thinks a faultless piece to see, thinks what ne'er was, nor is, nor e'er shall be," while in relation to even as good a book as the Bible we once heard a clergyman tell his listeners that he did not expect them to believe or agree with all of it. "But never mind that," he continued, "you believe some of it; then learn from that and live up to the teachings of that." And this was pretty good advice. If followed faithfully it will take one in the right direction, and quite likely to the proper and hoped for destination in the end.

It is just so with this publication; there is chaff in the wheat; sometimes a fly gets into the ointment, and on occasions Homer still nods. Yet there is much valuable information in it, and it is practical and simple, and always sticks to the text.

But don't spare us when you get the chaff, or see the fly, or observe the nod. Only remember to make your criticism clear and sparkling, rather than sour and turgid.

AN IDENTIFYING DEVICE.

The account of a new and novel identifying device on another page of this issue will be read with interest. That it will answer the purpose few will be inclined to deny. We believe it to be the first absolutely conclusive means of identification yet invented or suggested, registration and numbering having failed conspicuously.

Of course, if anything of this kind is to be adopted, it must come through legal requirement. No one will be disposed to put this or any other form of identification on his car unless he is obliged to do so, and it is a pity that any one should be obliged to. But the chief objectors will be those who want to escape the penalty of their recklessness, and these deserve no consideration. It would be a little hard to make the careful and responsible driver put on such a detector, but the expense will not be heavy, the device will not greatly injure the appearance of the car, and we are inclined to think he will make no serious protest against it.

Public feeling against reckless automobiling has almost reached the boiling point. For illustration, in sentencing the chauffeur, William Darragh, who had run over a boy and then fled to Texas, where he was afterward apprehended and brought back to New York for trial, the presiding judge is reported to have

said: "The next man who comes to the bar of this court charged with this offence may pay the penalty with his life." It should be explained that Darragh's crime was not premeditated, and under the common law and the former provisions of the code based upon it the person who kills another through recklessness, although without premeditation or intention, is guilty of manslaughter. Under a new section of the penal law, however, one who thus causes the death of another may be tried for murder in the first degree if the act by which the death is caused is "imminently dangerous to others and evincing a depraved mind regardless of human life."

Right here it may be remarked that statements have been made that automobile accidents are on the decrease. We know better. This is not a pleasant thing to say, but having a monthly list of the accidents all over the country and making a somewhat careful inquiry into them, it is true, nevertheless. And the number where the guilty escape detection by flight is increasing far faster than the whole number. This being the case, it would not seem to be an unreasonable requirement that something be enforced by law to make identification absolutely certain.

LET US HELP YOU.

We can't of course anticipate all the troubles our readers are likely to get into with their automobiles from time to time. On this account we have a "Trouble Department," in which is treated all the different problems which readers present for solution.

Whether this department is interesting or not depends almost wholly upon our subscribers. If each reader who encounters difficulties which he is able to overcome, would give us the particulars for publication, we could make this department perhaps the most interesting one in the whole paper.

Let us have an exchange of experiences. If a reader has met and overcome a difficulty which large numbers of others are liable to meet, we ask him to write the matter out for publication. We want our readers to help each other and they can do it to a far greater extent than is being done now without very much effort.

Send in your troubles, both those that you have overcome and those that you want help in overcoming.

AUTOMOBILE TERMS.

Chauffeur, chassis and tonneau are all foreign terms which might be anglicized into car driver, running gear and body, but they have come into such common use that possibly it may be as well to keep them.

"Carbureter" sounds mysterious but it is simply the gas-making apparatus into which the gasoline runs after which it is converted into gas by being mixed with air before being shot into the cylinders.

"Transmission" and "drive" are somewhat synonymous, but the first follows the second in running the car.

"Wheelbase" means the length of the car from the front hub to the rear one, while "tread" applies to the width of the machine. "Clearance" covers the distance between the ground and the lowest point on the chassis, usually the axles, and these figures give one a fair idea of what sort of roads can be covered in that particular make of automobile to which it refers.

"Radiator" does not mean the heating apparatus one might suppose. Instead it is just the contrary, being the device in the front of the chassis through which the water circulates that is used for the pur-

pose of keeping the engine cool. There are various types of these, cellular, tubular, etc., but all used for the same purpose.

"Bonnet" and "hood" mean the same thing, being applied to the metal covering that is placed over the engine when it is located in front of the dashboard.

OUT OF ORDER.

A new publication has just been launched under the sponsorship and protection of the American Automobile Association. Although no great industry or business is at present better represented by trade magazines of the highest character and ability, as well as of almost unbounded enterprise, none will object in the slightest to a further increase in this legitimate work. The field is a broad and liberal one and is open to all.

The only possible objectors will be some of the advertisers who are already spending money so generously and about up to the limit in the already established periodicals.

But there may possibly be some opposition to the business methods promulgated by the new magazine, when it practically advises the Association to boycott such firms as do not advertise in it. In referring to a sixteen page advertisement which it succeeded in securing in its third issue, it says editorially to the members of its Association:

"If you will continue your present course of patronizing the man who is patronizing you, and placing your business only with those concerns who manifest sufficient interest in your patronage and your organization to place their advertisements in your paper, you will soon have such a large and strong weapon in your organ that the Association will double and treble in number, efficiency and influence."

Tut, tut, Brother Editor, the chair will please call you to order, while in a friendly way we admonish you not to pursue this method or advise others to do so. It is not lawfully begotten; it is spurious and unhealthy. Let it "die aborning," so to speak. Don't advise the worthy members of your Association to use their organ as a "weapon." It sounds too much like a method that the law says is criminal, and which is expressed in a word we do not like to use in mixed and respectable journalistic company.

Better adopt the plan of this publication, Brother, even though you do not get so many 16-page advertisements. You will enjoy life better and possibly be just as successful in the long run.

LAW FOR AUTOMOBILE TRAFFIC.

Governor Hughes made a mistake when he vetoed the Hamn automobile bill. One of the chief objections to specific speed limits is that in cases of arrest or damage the question almost invariably turns upon whether the car was or was not going faster than allowed by law, and in most cases guilt or innocence is fixed by this fact alone. "Arrested because he was exceeding the speed limits," has become an everyday newspaper term. Now, in quite a number of instances and conditions a car may exceed the given specific speed limits and still not endanger other users of the highway, and on the other hand, it may be going at much less than these limits and be a decided menace to those who use the highway.

Moreover, imagination is likely to deceive a party as to the exact speed of an automobile. For example, a pedestrian crossing the street is likely to erroneously estimate the speed of an approaching car, and if run down by it, get the idea that its speed was suddenly increased, or that it had been in no degree slackened, and the driver of a car is also likely to be mistaken as to the exact speed he is traveling.

Neither the speed indicator of a car nor the stop

watch of an officer should set free or convict. The question to determine is whether the car is driven recklessly or negligently, or at a speed or in a manner which is dangerous to the public, having regard to all the circumstances of the case, including the nature, condition and use of the highway, and to the amount of traffic at the time or which might reasonably be expected. And in determining this, no one is better qualified than the police or others, in authority. The driver or owner of the car may be biased, and so may be the witnesses—for or against. If the properly delegated authority to determine such matters has a bias, then he is unfit for the place he holds.

In his veto the Governor refers to the desirability of home rule, and quotes a protest from Mayor McClellan of this city in which he says the measure "should not become a law if it takes away from the authorities of New York City that reasonable traffic control without which conditions in the metropolis would be intolerable."

But the Hamn bill provided for far better regulation than at present. It would make the highways safe for the public—something which the present law fails of doing. "Home rule" is desirable when local interests are alone affected, but when it affects the interests of others far beyond the confines of a particular city or town, then the law may well be general. Automobiles are often driven through a dozen towns and cities in a single day, and when the chauffeur is not familiar with local ordinances, injustice is likely to be done again and again.

The time is coming when automobile traffic will be regulated everywhere the same way that all other vehicles are now regulated—according to the nature, condition and use of the highway.

Recklessness in driving is not a matter of speed limits, but of conditions and circumstances.

THE WHEEL QUESTION.

The discussion of the comparative merits of high and low wheels elsewhere in this issue will be read with interest. Although the high wheels seem to have rather the best of it on points, so to speak, the fact that low wheels are the rule rather than the exception, counts for a good deal. Possibly, however, convincing tests have not yet been made, and manufacturers do not know beyond the possibility of doubt which is the better, all things considered.

The writer recalls the fact that some years ago when the old high wheel bicycle was in common use, the low wheel "safety," as it was then called, was not looked upon with favor at the outset. Most of us thought that the "ordinary" would ride easier. But we soon found our mistake by actual tests of a day's run.

There is one way that a comparison of high and low wheels for motor cars might be made and thus settle the point of superiority finally. Let some enterprising manufacturer have two sets of wheels for the same car, one set, say, 36 inches, and the other a third larger in diameter. Then let a thorough test be made of the amount of fuel consumed over given and varying highways and at given speeds with the smaller wheels, and let this be followed by another similar test with the larger wheels. Of course, the speed gear should be changed to suit the varying conditions, but we see no reason why such a test might not be made and prove decidedly instructive.

LESSONS FOR DRIVERS.

Carelessness and Ignorance Responsible for Most Accidents.

Automobile accidents continue with no abatement. Moreover, there is no perceptible difference from month to month in the causes that produced or led up to them. Contrary to what might have been expected from the amount of publicity given them, a good many accidents are still reported owing to automobiles being driven behind or near street railway cars. The long car is something of an obstruction to the vision, and time and again the passenger steps from it only to be run down by the approaching automobile. Below will be found examples of the most common accidents, and perhaps about one in fifty reported.

Of course, there is much carelessness, indifference and genuine ugly depravity on the part of many pedestrians and drivers of horse vehicles, to say nothing of the unlawful use of the streets and highways by children. But we are not talking to these. We are trying to make car drivers more discreet and to reduce the number of accidents they encounter.

Went Over a Bridge.—While speeding near Egg Harbor, N. J., three men were very seriously injured when their car burst a tire on a bridge, skidded to the side rails and then overturned into the water. The men were all seriously injured and the car pretty well wrecked.

Danger in Steel Tires.—In Brooklyn, N. Y., steel tires were recently tried on a ponderous ten-ton motor truck. All went well until the tire struck the smooth street railway rails when it began to skid and swerved wildly from side to side. It struck a trolley pole and moved it nearly a foot, and finally came to a stop when one wheel was completely wrecked and the axle badly wrenched.

Ran Out Suddenly.—Near Lockport, N. Y., a demonstrating car was going along at a comparatively slow speed when a little girl nine years old ran out into the street directly in front of it. It was impossible to avoid her and she was knocked down and killed. In cases of this kind the safest way is to bring the car to a stop, but this is often easier said than done.

Malicious Mischief Charged.—Near Rochester, N. Y., a man who had probably never ridden in an automobile before jumped into his friend's new car which was standing in the street and turned on the power "just for fun." It started, struck the curb, knocked over a stone hitching post, laid an iron fence low and finally stopped on the porch of a nearby house. The owner of the car was naturally a little angry, as it cost him \$3,500 and it was damaged to the extent of \$1,000. He had his friend arrested.

Struck a Telegraph Pole.—Near San Antonio, Texas, one man was instantly killed and another seriously injured when an automobile skidded as it crossed the railroad track and crashed into a telegraph pole. The machine was a total wreck.

Into a Rut.—Near Goshen, Indiana, while going at a high rate of speed a car got into a bad rut in the road and in turning it out it struck a deep ditch and finally collided with a big tree. Three people were thrown from the car and it will be a long time before they recover from their injuries. Strange to say the automobile itself was not completely wrecked, and probably \$500 will repair the damage.

Dodged a Mud Puddle.—When driving between Lowell & Boston recently and attempting to dodge a mud puddle in the road the machine turned turtle and the occupants of the car were thrown out with the car

over them. Three persons were taken to the hospital and it will be some time before they are well again.

The Uncertain Pedestrian.—In Savannah, Ga., an electric runabout was proceeding slowly when suddenly a man loomed out in the street before it. He dodged, now this way, then that, and the driver likewise dodged the car one way and another. Finally there was a collision and the man was knocked down and received a fracture of the bones of both legs, and other injuries. If car drivers could only be certain that pedestrians would keep along in one direction, maintaining their speed, it would greatly lessen the danger of collision.

Two Children Killed.—There are far fewer automobile accidents in Europe than in this country, and this is chiefly owing to the more sensible laws there, as a rule. However, in Belgium not long ago while one car was trying to pass another it struck against a wall and crushed two children to death. It then plunged down an embankment and upon a passing railroad train killing the owner, the chauffeur and injuring two train passengers.

Caused By a Flock of Sheep.—A man is nursing severe cuts and bruises in Dayton, Ohio, as the result of encountering a drove of sheep grazing in the roadway. One of them ran under the car, and it was overturned. It pinned the owner down where he lay for several hours before he could be extricated. The car was not very much damaged.

In a Street Sprinklers Way.—In Pittsburg, Pa., five persons were hurt and there were several miraculous escapes from death on account of driving an automobile in the wake of a street sprinkler. The asphalt was wet and slippery and the car skidded; turned half way round and headed straight for the sidewalk. The streets were full of people and some were knocked down while others escaped serious injury. When the car was stopped it was learned that five persons had been hurt.

The Steering Gear Out of Order.—In driving near Pottsville, Pa., the steering gear of a car got out of order, and the car collided with the side rail of a bridge which wrecked the machine, but the driver was not seriously injured.

A Lighted Match.—Not long ago a cigarette fiend—they are always called "fiends"—stood on the sidewalk uptown in New York and threw his still burning match into what he supposed was a tiny stream of water. Instead of that it was gasoline, which ran along the gutter, to a standing automobile which had a leak from the gas tank. The car caught fire and was destroyed.

The Crank Again.—Struck in the face with terrific force by an automobile crank which flew from a car, a man was knocked unconscious and had his nose broken. He has no idea to whom the car belongs and possibly he may be mistaken as to the kind of missile that hurt him.

Steering Rod Jammed.—In Brockton, Mass., a man with his family were riding along fairly slowly when in some way the steering rod got jammed and the car started for a high stone embankment. The car was stopped by presence of mind just before it was read to leap off into destruction for the car and eternity for the human cargo.

All Caused By a Dog.—A man and his wife were riding peacefully along the highway near Binghamton, N. Y., when a dog ran out of a farmhouse at the car. In trying to avoid the dog the car was turned one side and went into the ditch, turning a complete somersault. One of the occupants of the car was

seriously injured and the car was pretty well wrecked. But the dog was killed, after all, and this was balm of Gilead for the car owner.

While Going Down Hill.—While descending a big hill near Auburn, Ind., the steering apparatus became recalcitrant in some way and the car took the ditch. Five of the occupants were badly injured and the car was wrecked.

He Struck a Match.—Near Pottstown, Pa., a man went into his garage to black his shoes and he lighted a match to see a little better. In an instant there was a terrific explosion. The garage caught fire and was partly consumed, and the man himself was badly burned. The explosion was due to a mixture of gasoline and air.

Trying to Kill Time.—While trying to see how fast they could go near San Jose, Cal., a car containing two men was deflected by the rough road and made a mass of junk by collision with a tree. The two men were too much dazed at last accounts to know just how badly they were hurt.

Snake Runs Car Amuck.—A snake ran an auto amuck near Richmond, Va., not long ago, according to the veracious newspaper report. It appears that the snake—a copperhead—crawled from under the lap rug which happened to be on the floor of the car, and wound itself around the chauffeur's leg and the brake—so says the local scribe. In his excitement the chauffeur pulled the speed lever and let the car go. Finally the snake was felled from the car with a blow and ran over by a wheel of the car.

Bridge Dangers.—Losing control of a car near Troy, N. Y., it crashed through a bridge and fell a distance of 15 feet, the two occupants being badly injured. It was the usual fault—going too fast on a strange and tortuous road.

The Wrong Lever.—Near Cleveland, Ohio, a man got rattled in trying to avoid running into a friend and knocked him down. He apologized and the victim picked himself up and began to dust his clothes. But in starting his car, the man pulled the wrong lever and he started back. This time it not only knocked down the man who was just making himself presentable but ran over him and injured him severely.

Another Crank Accident.—In Lawrence, Mass., while a man was attempting to crank his car it flew back, striking him a powerful blow on the arm and breaking the large bone just above the wrist.

Playing in the Street.—While running his car at a moderate rate of speed in Athol, Mass., the driver of a car saw a child rolling a hoop in front of him. He pulled to the left hand side of the street, but the machine struck the boy and fractured his skull. The physician gives no hope for his recovery.

takes a street passenger car, that it shall not pass on the side which passengers get on or off until all have got safely on board or out of the street.

A Stone Fence.—The failure of the steering gear to work properly while the machine was going at a high rate of speed caused it to collide with a stone fence near Pittsburg, Pa. Four persons were seriously injured and the car was completely wrecked.

Result of Skidding.—Three Chicago policemen were in a large car when they struck a pavement that had been oiled. The car crashed into a big building and the occupants were thrown out and severely cut and bruised.

Skidded Into the Water.—A woman and her child were drowned near Stockton, Cal., when their car skidded over a high embankment into the water. They were pinned beneath the machine and were drowned before they could be extricated.

A Novice at the Wheel.—Near Leroy, N. Y., a novice wanted to try his hand at guiding a car which contained quite a large party. The machine began gaining speed and soon struck a telegraph pole which it broke into splinters. All of the passengers were thrown out and one received a broken hip. The rest were more or less injured. The car, which was a valuable one, was nearly wrecked.

Ran Into a Stray Car.—A leading farmer and banker of Lafayette, Ind., was found dead beneath his overturned automobile, having ran into a stray car on the narrow road after dark. The car pinned its occupant beneath it and killed him almost instantly.

A Slippery Pavement.—A slippery pavement and a steep hill were the cause of an automobile accident near Schenectady, N. Y., which pretty well wrecked a valuable car. The car began to skid when going at a moderate speed and the application of the brake of course caused it to skid more. The occupants of the car were severely bruised.

A Slippery Street.—While a party were driving in a heavy touring car in Fresno, Cal., the machine struck a slippery place in the street and overturned. One of the occupants of the car received a fracture of the skull and broken ribs and the others were seriously hurt.

A Rut in the Road.—The rear wheels of a car caught in a rut in the road near Bath, N. Y., and the car was wrecked. Two women occupants received broken limbs, and it was considered remarkable that the passengers were not all killed outright.

Struck a Washout.—A car made a plunge of 100 feet near Pasadena, Cal., turned several somersaults and was finally pretty well demolished. The six passengers almost miraculously escaped instant death. They will, however, pass a long sojourn in a hospital.

A CASUALTY INDICATOR.

Novel Device to Identify a Car That Causes Injury to Others.

There has thus far been no way by which to identify and bring to book the owners and drivers of cars who cause injury to others, provided they are disposed to flee to escape the consequences. Registration was at one time supposed to do this. The reason assigned for the necessity of this registration and a license number was that the vehicle should be readily identified and thus supply evidence against operators who violate the law and the rights of others. It was supposed that a number on a tag conspicuously attached to the vehicle would answer the purpose. But it has not done so. When a man is being run over, or after he has been run over, he is in no condition to scrutinize the license number of a car, or its general appearance. Moreover, there is a growing tendency among car drivers of the malicious sort to flee and thus escape the penalty of their misdeeds, if possible.

A device has been invented, however, and will soon be on the market, which seems to answer these requirements. It consists of a rod extending across the front of the car, and if this rod be hit or collides with anything or any person an explosion takes place, and the number of the car on cardboard discs is projected and scattered broadcast over the street or highway in such a way that it is impossible to escape detection. It may be remarked likewise, that this collision causes an audible report which attracts attention to that point, and thus furnishes an additional means of identification.

It has often occurred that when the owner of a car was going carefully and rationally along a road at night, he has been run into from behind and sustained damages, and the guilty party has always escaped whenever he desired to do so. If this casualty indicator device were used, the number of the car would have been left on the ground for identification and the culprit could thus be apprehended and punished for his recklessness.

It is not at all likely that car owners themselves will be eager to attach any device of this kind to their automobiles, but there is a probability that unless things are very much changed for the better they will be compelled to do so by state or municipal authorities. It may be remarked likewise that in case this device by any means explodes, and the driver attempts to run his car without having it reloaded, and contrary to regulations, it can easily be detected. It is expected that the police or highway authorities will require the reloading of the device with the discs as soon as practicable after an accident has occurred.

A Strong Crank Shaft.

If there is one part about a motor car that must needs be strong and stanch it is the crank shaft. Not only must it be of the toughest steel but it must be supported well throughout its length in order to remain straight and true under the terrific strain and pounding which it is designed to bear. Otherwise the life of the motor is materially shortened and the engine cannot run smoothly, much less develop its maximum power.

"Remember when passing a team not to cut in too soon; give the horses a chance." This sage admonition has been sent out by the Schenectady, N. Y., Automobile Club. It spells volumes for maintaining amiability on the road.

TESTING WIRE CONNECTIONS.

How Loose Ones May Be Found by Applying an Ordinary Telephone Receiver.

BY JAMES F. HOBART, M. E.

One of the worst things, if not the worst, which the automobile driver has to contend with is the loosening of wire connections with battery, coil and other apparatus to which the wires must be securely connected. In case of trouble, the wiring is the first thing to be looked after and nothing else is usually done until it is certain that the connections are intact from battery to spark plug. To do this—to make sure that each and every connection is tight—there is nothing to do but to examine each one of them, to test with the fingers each screw and to see that no wire has slipped out of place or is broken or otherwise disconnected from its proper place.

It is quite a task to go all over the entire number of connections in an automobile and it is not always performed in a manner which can be depended upon

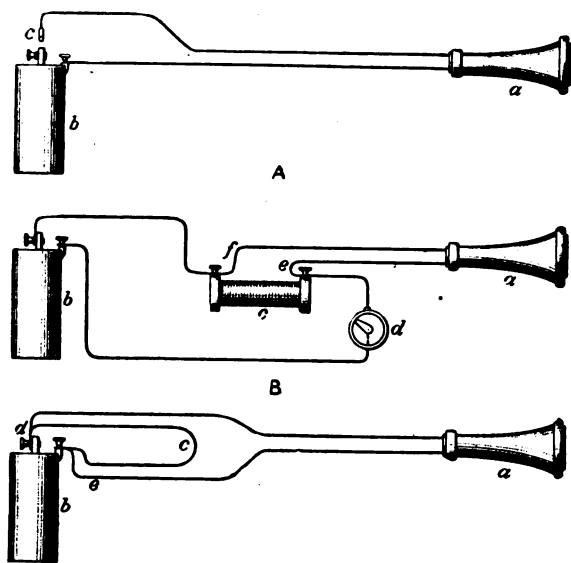


Fig. 1.—Testing wire connections by telephone.

for thoroughness. Sometimes it is necessary to go over the wiring several times and even then poor connections are to be found in spite of all the hand testing and examining which has been done.

There is a certain property or characteristic belonging to the ordinary telephone receiver which may be applied to the testing for loose connections in wiring and in other electrical circuits. This matter may be made plain by a little study of Fig. 1, which represents a telephone receiver connected in three different ways for the detection of the passage of current through a conductor. The principle of the method is illustrated by sketch A, the receiver *a*, being connected to one pole of battery *b*, the other terminal being left loose as shown in *c*. After connections have been made as described and shown, place the receiver to the ear and no sound can be heard as long as no connection exists at *c*. But let this wire be touched ever so lightly against the binding screw of the battery, and noise reigns supreme in the receiver. The diaphragm rattles and snaps as the connections are rubbed together and the noise continues as long as motion exists between the two points at *c*.

Let the contact at *c* be made and left closed and there will be no noise in the receiver. Everything will be quiet there. Again, touch point *c* against the battery binding screw and hold it firmly in place. As

a contact is made, a single sharp tap will be heard in the receiver but no sound is audible as long as the contact is firmly closed. Next, remove point *c* from the battery terminal and another sharp tap will be heard. This is when the circuit is broken and the diaphragm flies back away from the magnet of the receiver. The first tap was caused by the diaphragm being jerked against the end of the magnet when the battery current flowed through the telephone.

Thus it is shown that not only is noise produced in a receiver when a current flows into the magnet coil, but noise is also audible when a current is cut off from the coil. In fact, any variation in the strength of the current will cause noise in the receiver, and the movement together of the ends of two wires will cause connections of varying good and bad quality through which more or less current flows to the receiver coil. And it is the noise caused by the varying current which can pass through a loose connection, which renders it possible to test all electrical connections by telephone.

In Fig. 1, sketch B shows how the telephone may be applied to test the connections in a simple touch-spark circuit, where *b* represents the battery, *c* the spark coil, *d* the sparker, or "make and break" arrangement. The telephone receiver is to be connected across the circuit at any convenient place. It is shown connected at *e* *f* across the binding posts of the spark coil, but the receiver may be connected across the battery terminals, or one wire *f*, or *e*, may be attached to the battery, while the other wire is attached at *d*, or at *e*, or it may be joined anywhere along the circuit to the wire direct and work with equal sensitiveness. With the receiver connected as shown or as described, it is only necessary, in order to test all the connections, to seize each wire between the thumb and finger, and wiggle it to see if the wire is fast in its binding post. Listen at the receiver while the wires are being worked back and forth, and if no noise is heard in the receiver—while the current is on the circuit—then you may rest assured that the connection under test is not loose. Test each wire connection in turn and it may be done very quickly as it is not at all necessary to look at each wire and binding screw as must be done by the old way of testing for loose connections.

Indeed, this method of testing is very sensitive and the reader may make the following test to show how sensitive it really is. Connect up as shown by sketch C, Fig. 1, where the battery cell, *b*, is short-circuited by the very short length of wire *c*. A word of caution is necessary here. Do not allow any cell to remain thus short-circuited any longer than is actually necessary to make the test, as such short-circuiting will run down the battery very quickly. Make up the telephone connections *d* and *e*, first, then the receiver will be solidly connected across the battery and any movement of either end of the wire on its binding posts, will be faintly heard in the receiver.

A more delicate test is to connect *c* firmly in place and then test with *d* or *e* for poor connections in those wires. It will be found impossible to move either of these terminals even so slightly, without causing a faint noise in the receiver. Therefore the test is so delicate that loose connections can be detected in a circuit in which the battery is short circuited through a foot of No. 16 wire. This is fully sensitive enough for all automobile testing purposes.

The automobile driver may at his leisure rig up some terminals at any convenient place in his auto, into which he can place the terminals from a telephone re-

ceiver whenever it is desirable to make a test of the battery wiring and connections. Individual ingenuity will suggest many ways of making these connections, but it will be well to look a little further into the matter and see what possibilities exist in the direction of testing complicated circuits with the least possible trouble. The possibilities in this direction are very great. Not only is it possible to sit in the machine

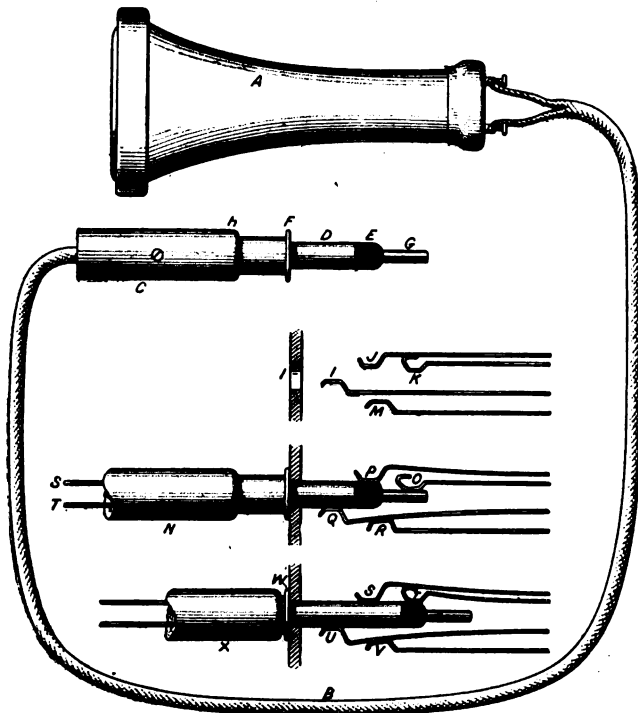


Fig. 2—Trouble test telephone.

with a telephone to the ear and let some one paw over the connections with certainty that you can tell him when he touches a loose one, but it is also possible to connect the telephone while the machine is running and listen to the action of the battery or generator in its task of ignition.

By means of the proper connections for a receiver, the action of the ignition apparatus may be investigated while actually at work in much the same manner that a physician listens with his stethoscope to the action of the lungs while they are doing business. Any lack or decrease in battery power will be evident to the listener, and the action of the ignition apparatus can be studied with ease to see that it is in perfect time and that there is no irregularity of timing or of other improper electrical action. As shown at the beginning of this article, it matters not as far as detecting loose connections is concerned, whether the receiver be connected in series with the circuit to be tested, or whether it be connected in multiple therewith, and bridged across the circuit at any convenient points.

Fig. 2 illustrates how other telephone apparatus may be impressed by the autoist with desirable results. In Fig. 2 there is shown an ordinary telephone receiver, A, connected by means of the double flexible cord, B, with the bit of apparatus, C, which is known to telephone central operators as a "plug" or as a "jack." This bit of apparatus is picked up by Miss Central when she answers your ring, and she places it in the plug-hole shown at I, which covers the various portions of apparatus to which the wires from your telephone are connected. The apparatus A B C

is not as is used in telephoning. It has been arranged for auto connection testing. But the plug picked up by Central and thrust into a hole opposite the number of your 'phone on the switchboard, encounters a number of spring contacts somewhat as shown by J K L and M. It will be noted that J and K are in contact, while L and M are separate from each other. This representation is not exactly as it exists in a regular exchange. The connections here shown have been modified to suit the purpose of this description in connection with the use of the same apparatus for connection testing.

Referring again to the plug C, it will be noted that the hard rubber handle terminates at H, and the portion from F to H can slide inside of C when pressure is applied at F. When the pressure is removed, F immediately returns to its proper position through the action of a coiled spring concealed inside the hard rubber handle H. The contact, D, is attached to one of the wires leading to the receiver, while contact, G, is attached in a similar manner to the other wire. The dark mass, E, is some hard rubber insulation, the purpose of which will be shown later.

At N, the plug is shown in position inside the hole and represents for purpose of illustration that it is connected to the regular station apparatus instead of to the insulated receiver. In this case, contact Q would rest upon the contact which is connected with wire T, while contact O bears against the terminal of wire S. It is also apparent that contacts O and P have been separated, the latter resting securely upon the hard rubber insulation of the plug, therefore quite disconnected from any of the other spring contacts and from either of the plug terminal contacts. At the same time, contacts Q and R have been brought together from the open position they occupied as shown at L and M.

The above action as shown applies to telephone call answering, and has nothing to do with auto wire testing, but it has for explaining the action of plug C, which it is proposed to utilize in auto connection

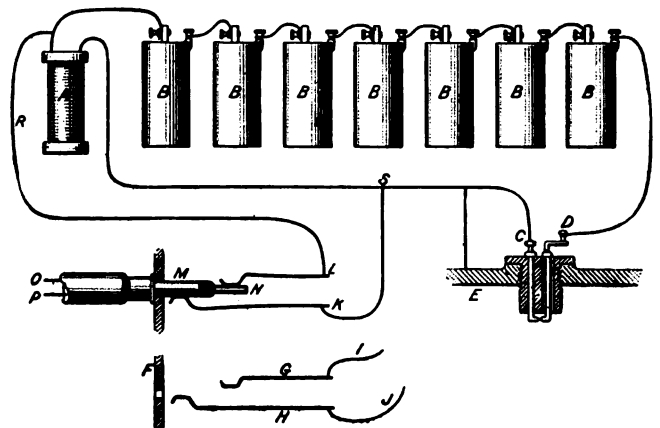


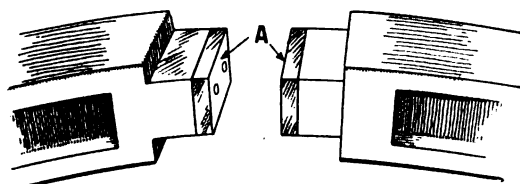
Fig. 3—Testing a touch spark circuit for loose connections

testing. The central operator, at this point has received from you the number of the other 'phone with which you wish to talk, whereupon she takes up the plug from your line and thrusts it into the socket of the line you are to be connected with. When the plug is in the position shown at N, your line is connected for talking with the 'phone you want, but its owner does not know it, and he must be signaled. This is where the spring slip comes into action.

Central pushes the plug in to the limit and it takes the position shown at X, the spring slip, W, being

For Wear of Expanding Brakes.

From J. H. H., New York.—I own a car which is fitted with expanding brakes and soon learned they had a tendency to wear rapidly. The price charged for renewal is more than one would expect, and consequently I looked round for a way out of the difficulty. What I have done for two years is as shown on the accompanying drawing, viz., had "pegged" a small piece of steel A on each shoe, about $\frac{1}{8}$ -inch thickness, then, when the shoes are further worn, this is taken off and a piece $\frac{1}{4}$ -inch thick, and so on. The



To save the brake.

cost is very small indeed, and the job such a simple one that it can be done by any ordinary man with a small knowledge of engineering.

A Plea for Hard Tires.

From The Swinehart Clincher Tire & Rubber Co., Akron, Ohio.—We have noticed an article in the Trouble Department of your May issue, under the heading of "Pneumatic and Hard Tires" where your editor states that a solid tire requires more power to operate than a pneumatic. We find this to be contrary to the results of our tests and experiments, as we have repeatedly demonstrated that the solid tire requires less power than a pneumatic. This is due to the fact that on dirt roads a pneumatic tire has to beat down a larger area of the road surface than a solid, consequently it requires more power. On electrics we have found that our solid tires draw less amperage than a pneumatic tire.

It Prevents Accidents.

From W. C. Brown, Missouri.—Sometime ago you requested your subscribers to give their views on a continuance of the column referring to accidents. I for one am heartily in favor of your publishing all the accidents that you can, as it is not only a means of seeing how others are hurt, but ought to be a sure cure for the prevention of accidents. My advice is to continue along that line.

Rusted Car Springs.

If the springs of a car have become very much rusted the only cure is to take them down. This will necessitate jacking up the frame, not the axle, and supporting it while the spring shackles and clips are released. The springs will then have to be dismantled, each individual leaf cleaned with emery cloth, well lubricated with grease and remounted. One spring should be done at a time, so that the leaves, bolts, etc., may not become mixed.

An Emergency Nut.

One way to make a nut that is too large do for emergency service is by hammering one side of the nut until the round hole assumes oval shape. In this way the nut will take hold of the threads of the bolt on two sides and will maintain the part in position until a nut of right size can be secured.

TIRE INFLATION.

Some Useful Notes and Two Simple Rules Worth Remembering.

Of all questions relating to the preservation of pneumatic tires, says the manager of the Michelin Tire Co., that of inflation is one of the most important, and it is to every motorist's interest to look well after the air pressure maintained by his tires.

Improper inflation is one of the commonest causes of the deterioration of tires. Indeed a full 50 per cent. of the tires tested by us, on cars weighed at our works and depots, are inflated below normal pressure, while of the tires sent to us for repair, nearly 60 per cent. have suffered more or less from under-inflation.

It is not enough simply to fit your tire, inflate it to the correct pressure and then take no further notice of it. On the contrary, you must test it from time to time, to make sure that the air pressure has not decreased, for there are several ways in which a leak may be brought about.

In the first place, the valve may not be air-tight. If, for example, the seat of the plug has not been carefully cleaned—if only a single grain of dirt has been left upon it—it will cause a leak. Again, if the rubber washer at the bottom of the valve cap is not in place, the air will most certainly begin to escape. Then, again, in tightening up the valve parts you may have used pincers, thus damaging the screw-threads and causing a leak.

You must take into consideration, too, the fact that after a new tire has been a little while in use it expands. This expansion, of course, results in a diminution of the interior air pressure.

Tires should always be inflated with air; never with carbonic acid gas.

Air, it must be remembered, is composed chiefly of oxygen and nitrogen. The co-efficient of diffusion of the oxygen through the rubber is higher than that of the nitrogen, and the consequence is that the pressure in a recently inflated tire declines in proportion to the diffusion of the oxygen.

Consequently, when the tire is re-inflated, a larger proportion of nitrogen is introduced, and the larger this proportion becomes, as the result of repeated inflation, the less possibility is there for the tire to suffer loss of pressure by diffusion.

We may remark in passing that the temperature of the outer air is also responsible for certain changes in the interior air pressure of a tire. These, however, are so very slight that they may be disregarded altogether.

For all these reasons, then, it is obviously very necessary indeed that you should frequently take note of the exact air pressure in your tires—and nothing is easier, with the help of the tire pressure tester.

If this instrument shows a reduction in pressure, however slight it may be, it should be checked at once, and the tire re-inflated to its proper pressure.

It is as bad to inflate too much as too little.

Over-inflation not only subjects the canvas of the cover to an unnecessary strain, but also robs the tire of all its flexibility. Without its proper resiliency it would, of course, be no better than—and would be just as uncomfortable as—a solid tire, and instead of absorbing the obstacle over which it passed, it would rebound from it.

The consequence would be that the mechanism of the car, instead of being protected by the tires from shocks and shakings, would have transmitted to it the

full force of every jolt. This continued jarring of the several parts would soon bring about the complete destruction of the engine.

"Neither too much nor too little," should be the motto of the motorist; and that he may ensure his arrival at the happy medium in this important matter of inflation, let him observe the following two very simple rules:

1. Consult an inflation table.
2. Use a pressure tester frequently.

THE CAR OPERATOR.

Winthrop E. Scarritt on the Man Behind the Wheel and His Responsibility.

At the opening of the spring term of the Automobile School of the West Side Young Men's Christian Association, New York, the principal address was delivered by Winthrop E. Scarritt, his subject being "The Man Behind the Wheel." He said in part:

Upon the man behind the wheel depends the life and safety of the man in front of the wheel. Hence the entire community is interested in the character and qualification of this individual. There is an army of 200,000 men in this country driving machines.

The first qualification necessary for a man who proposes to drive a motor car is that he should have a deep sense of the responsible position he is to occupy. Without this sense of obligation, no man should be permitted to drive an automobile upon our highways. In the last analysis, the motor car means that man, by his genius, has succeeded in harnessing a little part of the forces of nature, and has hitched it to his individual chariot. Far more powerful than any muscular strength, the motorist has under control of foot and hand, a giant force that is a blessing or a curse, depending wholly upon the self-control and discretion of the operator. I emphasize the point of personal responsibility because it is too little appreciated. I would make the following suggestions concerning the training necessary to operate an automobile:

1. A thorough mastery of the car in all its mechanical details and the laws of its operation. Among otherwise intelligent people there is a vast ignorance on this subject. At the close of an instructive lecture on the automobile I once heard a very able banker say: "What beats me is why when you pour gasoline into the thing it should make the wheels go round." That man evidently did not know the difference between a carburetter and a cornucopia, or between the differential in a calculus and the differential on an automobile.

2. A careful application of what psychologists term the Law of the Association of Ideas. Reduced to the simplest form it means that the human mind does more easily any act the second time than it did the first, more easily the third time than it did the second, and so on. By the constant repetition of an act under certain conditions the mind will work almost automatically. After taking his place behind the wheel the driver should stop and reflect just what acts are necessary to stop the car. The driver should learn that to stop the car he must push the foot lever, releasing the clutch and jam on the brake. Therefore, he should say to himself again and again: "Push that lever, put on this brake, push that lever, put on this brake, push that lever, put on this brake." Of course, he should practice doing this as well as repeating the formulae in his own mind. By constant and contin-

uous repetition of this thought, perhaps hundreds of times in a day's driving, his mind will become so saturated with the idea of what he is to do that in case of emergency he will automatically do the right thing. I cannot too strongly emphasize the importance of this rule.

3. The driver should always have a clear head. Of course, this is easier said than done. Nevertheless, no man is fit to drive a motor car who does not learn to keep cool.

4. Never take unnecessary chances. If in doubt as to the wisdom of driving past another car or between two street cars, always give yourself the benefit of the doubt. There is an old rule that one would better be safe than sorry.

5. Treat your car with respect. If any slight adjustment is required, make it at once or a large repair soon becomes imperative. In no other field is the adage more applicable that a stitch in time saves nine. It pays not to speed over rough roads. It pays not to jam on the brake in order to make a grand stand play when you wish to stop. It pays to keep your motor clean and well lubricated.

6. Respect for law is also an essential of good driving. There will be enough accidents by the best of drivers owing to the criminal carelessness of pedestrians in stepping off the sidewalk in front of automobiles, but the car, even under such conditions should be under such perfect control and traveling at such modest speed that it can be brought to an immediate stop. The public sense of justice has been outraged recently in our city by the driving of too many reckless automobilists. Such men should not be permitted to drive a car on our public highways any more than a lunatic should be permitted to parade up and down Broadway with a loaded shotgun.

7. Never forget the great rule of automobiling, namely, drive your car with care and consideration for other users of the highway. In short, do unto others as you would have the do unto you.

Ignition Importance.

The success of a car largely depends on the quality of its ignition system and devices. The dual system is well worth having—although a single timer may be used for both the systems so that two complete and independent systems are in possession. Superior grades of magnetos are costly, and there are many styles of magnetos as well as grades. In one case the magneto is built into the flywheel, thus becoming as it were a part of the motor. The magneto has come to be considered almost a necessity, and the coil system of ignition seems to have reverted to second place. The latter system has, however, made strides. Formerly coils were not quite up to a fitting standard, primarily because the wire in the magnetic circuit was not of a high magnetic permeability. It was almost impossible to regulate the spark as the lag was not regular. The users of the high tension jump spark, and those who have the low tension whip spark both swear by them, and each user backs up his statements with evidence which can not be refuted.

No Place for an Inner Tube.

To put an inner tube, uncovered, into a box full of loose tools, oil cans, etc., is only a little better than throwing it away. The tools will chafe and the oil will rot it, so that, if it holds air at all when inflated, it may soon burst under the weight of the car.

Patching a Cracked Water Jacket.

H. L. Chapman in the Gas Engine.—For the benefit of such as may have cracked water jackets I will send description of how I have repaired a great many, and as yet have my first failure to find.

I first cut a piece of sheet steel or iron, No. 14 thickness or thicker up to $\frac{1}{8}$, and form it to fit over the crack closely, the thinner metal is thick enough to hold all right, and is more convenient to work than if thicker. Having the piece fitted, I drill holes each side of the crack and about 1 to $1\frac{1}{2}$ inches apart, according to the thickness; first drilling the plate, then laying out two holes on the cylinder at opposite ends, I drill them and tap for a small screw. I usually use 12-24 machine screws, either with button head or countersunk. Having fastened on the plate with these two screws, I use the plate as a guide to drill all the other holes in the cylinder. Having the holes all drilled and tapped, I mix some steel cement, making it a little thinner than the directions, so it will not set too quickly, and I spread this over the opening, and see that there is some of it in each of the screw holes. Having covered the whole surface, I put on the patch and draw it down with the screws as rapidly as possible, and see that it forces the cement from under the edge of the plate at every point. When this patch is put on as described and allowed to set for twenty-four hours, it will be almost as solid as the metal itself, and unless it is at some place where the working strain on the casting is stronger than the plate and tears it loose from the screws, will hold as well as the solid cylinder; if countersunk head screws are used, these can be filed smooth on the outside, and when the patch is nicely painted it looks like a small raised portion of the cylinder, and does not have the appearance of a patch when properly put on.

Driving Wheels from Live Axles.

Where wheels are driven on to tapered live axles they are sometimes difficult to remove. One successful method employed is to fix an extension on to the

hub cap, and to drill this to receive a bolt. The hub cap is screwed on to the wheel after the retaining nuts have been removed and the bolt screwed up. It will be seen that this step is for the bolt to push the axle in and the cap to draw the wheel out. If the thread holding the hub cap on to the wheel will stand it the wheel will come off, especially if the hub has first been treated with kerosene, although considerable strain may be imposed upon the thread of the hub cap according to the tightness of the wheel upon the taper. Care must, therefore, be exercised as to the amount the bolt is tightened up, if the wheel does not start easily, as the strain the parts will stand depends on the design and thickness of the hub cap and strength of the thread. In many cases a wheel will start if the bolt be tightened up slightly and the wheel then struck a few sharp blows from behind. A modification which may effect the purpose, though the arrangement is not such a good one, is given. Here the hub cap is merely screwed back upon the axle with a number of washers interposed between the cap and the axle end. As the cap cannot screw right home on account of the washers, an axial thrust is set up which may dislodge the wheel. Here again the action is dependent upon the strength of the hub cap thread and that of the hub cap.

If the Lamp Glass Breaks.

If the glass of the tail lamp breaks there are two ways by which immediate progress is rendered possible. The first is to procure a sheet of thin red tissue paper at a stationer's and to tie it over the frame which held the glass. As there is no head draught against the tail lamp, this is practicable. A second method, which applies to any lamp on the car, is to get a sheet of thin paper, double it, grease it, and lash it over the lamp front with wire. This is sufficiently transparent to allow of legal limit traveling with a single acetylene headlight, and at this pace a double layer of the paper is windproof for a good many miles.

SOME GOOD TOOLS.—Mr. Jas. F. Hobart, who has furnished us with a great many practical articles, in a recent communication, says: "Don't try to see how many tools you can get into your repair kit, but do try to see how many good ones you can keep." There is something about a good tool which gives its owner more satisfaction than almost any similar outlay. In this connection we would like to direct attention to some tools which the Billings & Spencer Co. of Hartford, Connecticut, have brought out for the use of automobilists. In a small wooden case they pack five "General Service Wrenches" which will often be found extremely useful. They have also made up a kit containing not only the wrenches referred to but also a hammer, screw-drivers, pliers, wrenches, cold chisel, punch, cotter pin tool, etc. The "All Steel" screw driver recently brought out by them is complete in one piece. It is drop forged of steel throughout and the point is carefully tempered. It may be possible to make better tools than the Billings & Spencer Co. make but we do not know who does it, and do not believe it can be done.

DO YOU WANT A PUNCTURE PROOF TIRE?

—If so, correspond with the Swinehart Clincher Tire & Rubber Co of Akron, Ohio, and get their catalogue No. 5 giving full particulars. These tires, they say, are from three to five times as durable as pneu-

matics. They fit any standard clincher rim and are easily applied. Physicians ought to be especially interested in a tire of this sort. In writing mention THE AUTOMOBILE DEALER AND REPAIRER.

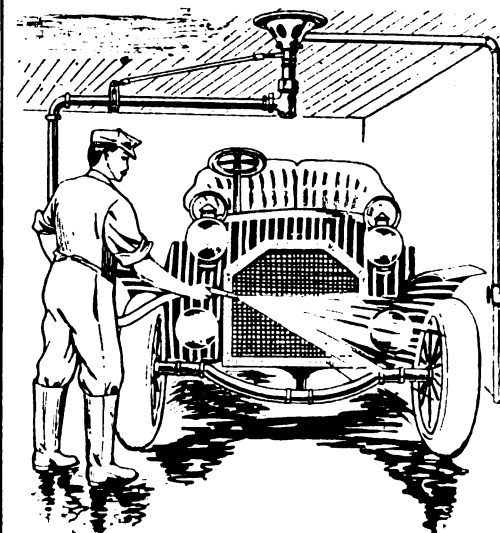
HERCULES PORTABLE CRANE HOIST.—This device is especially useful in garages, and a great many of our readers are using them. Every garage ought to have one. Write for descriptive circular at once to Wm. S. Nicholls, manufacturer, Hoosick Falls, New York.

AUTO AIR CUSHION.—Do you know what they are? If you don't it will pay you to find out, and you can obtain full particulars by writing immediately to the Mellen-Edwards Company, 403 East Grand Ave., Beloit, Wis. The Auto Air Cushion will give you comfort, pleasure and save you trouble and expense. It is easily attached. There are no broken springs with this cushion.

VEHICLE WASHERS.

In this issue will be found the announcement of John W. Frey, 722 Main Street, Buffalo, N. Y., manufacturer of the De-Luxe Rotary Overhead Washer as shown in the accompanying illustration. This washer is constructed of phosphor bronze, long bearing surface, indestructible ground and packing swivel union. It is absolutely

leak-proof and self-lubricating. It is finished in aluminum, does not rust enamel, and is very attractive and durable. Write



De Luxe Vehicle Washer.

at once to learn further particulars of the special 30 days free trial proposition made to the subscribers of THE AUTOMOBILE DEALER AND REPAIRER.

NEW BRANCH STORE.

The Empire Tire Company of Trenton, N. J., has moved their branch store from 20 LaSalle Street, Chicago, to more commodious quarters at 1305 Michigan Avenue,



The Empire Tire Company's New Branch Store.

of which Mr. E. B. McKay is the manager. The business of this firm is rapidly growing, and more room is being constantly needed to take care of it. The illustration is from a photograph.

A TOUR THROUGH CUBA.

Mr. H. S. Firestone, president of the Firestone Tire & Rubber Company, Akron, Ohio, who is an enthusiast over the subject of good roads, has recently completed an extensive tour through Cuba and the South. With him in Cuba were Mr. James Couzens, secretary and treasurer of the Ford Motor Company of Detroit and Mr. Frank Presbrey, general advertising agent,



The Auto Party.

of New York. While in Cuba these gentlemen did considerable motoring and the illustrations show not only the parties in their motors but give some idea of the excellent roads for motoring in the western part of Cuba. There is no place on this side of the Atlantic where the pleasures of motoring are so great as the beautiful

island, and the present government seems to be alert in extending the good work begun by the United States in building splendid thoroughfares of the highest class



A Cuban Road.

throughout the island. The roads are mostly made of the coral stone formation which works down into a hard surface almost like asphalt.

A GOOD BURNER.

The lamp itself is not of much consequence; it's the burner that makes it either good or bad, and when it is good, like the little girl in the rhyme, "it is very, very good, and when it is bad it is horrid." Knowing this, the American Lava Company of Chattanooga, Tenn., are making a burner that is individually tested before it is sent out and it has become so popular and has given such universal satisfaction that they



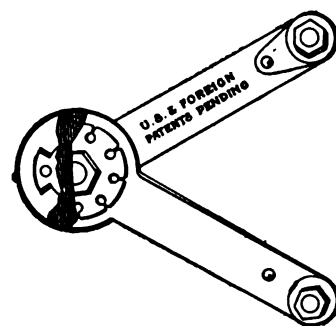
De Luxe Burner.

are used by every lamp maker in America save two. The firm says: "We cater to the prejudices of the trade by offering to supply almost every style, material and mounting, for which there is a recognized demand. We make all styles and mountings in all gas capacities, and carry 150,000 burners in stock. We annihilate distance by delivering all orders to post office or transportation companies within an hour of receipt." The illustration shows the DeLux burner which is truly a luxury. There is nothing else so good at any price. The hexagon base is the feature, as burners may be installed with a tiny S wrench, leaving the pillars without a scratch or mar. Turned from solid brass rod, highly polished and conforming in finish to all lamps and fittings. Standard thread. Pillars are also threaded inside at top, likewise the lava burners, which therefore screw into pillars. For further information address the American Lava Co., Chattanooga, Tenn.

Subscribe to the "Automobile Dealer and Repairer," \$1.00 Per Year.

WESTEN SHOCK ABSORBERS.

Shock absorbers prolong life, protect springs and create easy riding. If all knew that vibration means actual injuring to their car perhaps more attention would be given to devices that check such destruction. For some time past the Westen Manufacturing Company of Newark, N. J., have been working to bring forth a shock absorber that would automatically adjust itself to the varying conditions of the road and the changes of weight to which the springs are subjected. They now say they have patented a device that will do this and at a price that is by no means high. Two friction planes are used in this device so arranged that the smaller of the two is brought into action on small obstructions or the ordinary oscillation, while the larger plane checks or breaks the shock caused by unseen depressions or rough road beds. The manufacturer claims that after once Westen Shock Absorbers are attached



A New Shock Absorber.

to the car no further adjustments are necessary, and that there are no moving mechanical parts to continually get out of order. They are simple in construction and mechanically correct. Further information will be willingly supplied by the Westen Manufacturing Company, 290 Halsey Street, Newark, N. J.

ASBESTOS BRAKE LINERS.—This article is manufactured by the Empire Tire Company of Trenton, N. J. They say, "a close woven, long, stable asbestos offers the highest co-efficient of resistance with the lowest per cent. of wear. A short coarse staple soon crumbles and goes to pieces. A rubber coating is placed on both sides of the asbestos cloth. This is to unite the layers of asbestos together. Rubber is not beneficial to a brake liner, as it burns away after a few applications of the brake, consequently as little rubber as possible should be used." But write to the manufacturers as given above for full particulars and prices and mention THE AUTOMOBILE DEALER AND REPAIRER.

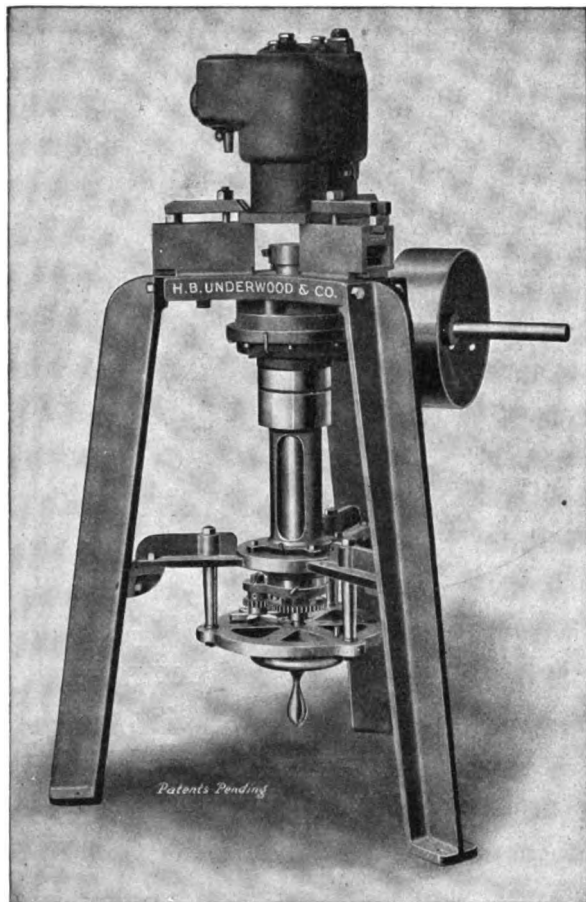
THE BRICSTON DETACHABLE TIRE TREAD.—In this issue the Bricston Mfg. Co. of Brookings, S. D., have a full page announcement on our third cover describing their detachable tire tread. It will be seen that Dr. W. J. Maytum of Alexandria, S. D., although prejudiced against all tire treads, expresses himself as well pleased with this particular tread. But consult their advertisement and then you will know more about it, and if you want still further information, with price, write to the manufacturers, as above.

SPARK PLUGS.—The attention of our readers is directed to the announcement in this issue of Long Brothers, of Kokomo, Indiana, manufacturers of timers, Buick specials, mica and porcelain spark plugs, which are built for service. In writing to them for further particulars, please mention THE AUTOMOBILE DEALER AND REPAIRER.

AUTOMOBILE CYLINDER REBORING MACHINE.

In consequence of its general line of work, H. B. Underwood & Co. have been frequently called upon to rebores automobile cylinders, and finding it a difficult matter to do it economically and efficiently on standard machine shop tools, designed the machine shown in the accompanying half-tone. It operates in a vertical position, occupying but little space and requiring not more than a one horse power electric motor

note on the spindle below, the travel needed; the latter is graduated for this purpose. As the work is done in a vertical position, the chips fall out, do not clog the cutters or in any other way interfere with the work. The machine is easy to operate and accomplishes an excellent piece of work, reboring the hole parallel, round and with the original alignment. Usually only one cut is required and this may be run through in remarkably quick time. For



For Reboring Cylinders.

to drive it. The drive shaft meshes with a worm wheel which revolves the cutting spindle.

The spindle is equipped with an adjustable head which is used to center the cylinder and is then removed and the cutting tools substituted. The cutterhead consists of four tools set out equally by a taper in the centre and is thus adjusted for the depth of cut required. The feed is automatic, variable and reversible, having a star wheel engaging one or more knockers to suit requirements. The cylinder to be rebored rests upon three adjustable sliding blocks which are planed true and at right angles to the spindle. Clamps hold the cylinder in place after it has been centered, and as it rests upon the same face which is bolted to the crank case, original alignment is assured. It is immaterial whether the cylinders are cast separately or together; they are rigidly held without distortion. This machine is also capable of boring as well as reboring and several may be used in the space which a large machine tool would occupy, thereby saving space and power. Inasmuch as most automobile cylinders are blind, it is only necessary to measure the length of cut required and

further particulars address, H. B. Underwood & Co., 1025 Hamilton St., Philadelphia.

A NEW DRY CELL.

In presenting the Union Dry Cell to battery users the Union Battery Company of Belleville, N. J., have kept in mind the



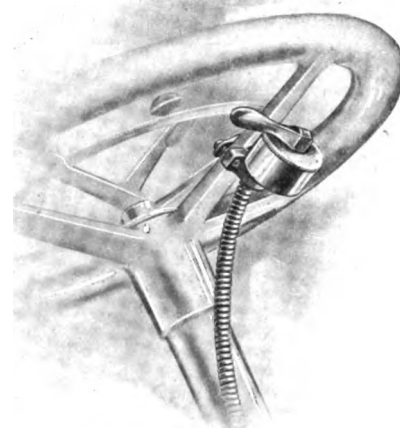
A New Dry Cell.

need of an ignition battery that would withstand the racket given batteries by most motorists and still give perfect ignition with a fat, hot spark. Much time has been spent in experimenting and perfecting this cell until now the manufacturer feels

confident that Unions will give better service, retain life longer and put forth more energy than any cell now on the market. Their quick recuperation after a heavy demand is unusual, while their depreciation is very little. Upon test with a standard ammeter they register over 25 amperes with a voltage of 1.6-1.8, but the real proof of their value can only be found by their use.

NEW STEERING WHEEL SWITCH.

The Connecticut steering wheel switch is a neat little device which fills a long felt want and will be appreciated by the driver of an automobile. It puts the ignition control under the right hand of the driver and may be manipulated without the hand leaving the wheel. Four different positions are provided as follows: "Off," "Battery," "Magneto" and "Magneto and battery together," for different cars provided with two ignition systems, or may be used with magneto or battery system alone. It is only 1½ inches in diameter and made en-



Steering Wheel Switch, Manufactured by the Connecticut Telephone & Electric Co., Meriden, Conn.

tirely of brass and absolutely dust and waterproof. It is fastened by a bracket under one of the arms of the steering wheel and the controlling lever may be removed making the car safe from interference during the absence of the driver. Only two wires are used which are encased in flexible brass tubing and connected to the battery and magneto. No other switches are necessary. It may be installed by anyone. It is so simple that disarrangement is impossible and may be mounted by anyone. The switch is furnished all wired with flexible tubing complete. It is made by the Connecticut Telephone & Electric Company, Meriden, Conn.

"MAKE 100 PER CENT A MONTH."—This is the heading of the advertisement in this issue of the Union Welding Company of Kansas City, Mo., and other points. They advise repair men and garages not to throw away broken castings or broken parts of machinery, but to install a welding plant with which they can repair all such fractured parts. Send a sample of a broken part to this company and they will repair it and return it to you as a sample of their work. After you have tested it you will probably agree with them that there is much money in making repairs of this sort on your own account. In writing for further particulars mention THE AUTOMOBILE DEALER AND REPAIRER.

WANT ADVERTISEMENTS.

Under this head will be printed advertisements of shops for sale or to rent, or shops wanted, or situations or help wanted, or tools or machines (second-hand) wanted or to exchange, at the uniform price of two cents a word, which will include the address, for each insertion, payable in advance. No advertisement will be inserted for less than 80 cents, however small.

Remittances can be made in postage stamps if more convenient. Address,
MOTOR VEHICLE PUBLISHING CO.,
24 MURRAY STREET, NEW YORK.

BUY FROM THE ORIGINAL OWNERS—

Over 500 private owners have listed their automobiles with us for sale. Among them are many choice bargains. Write us about what you want. The Motor Car Exchange, 605 14th St., N. W., Washington, D. C.

COMMERCIAL MOTOR VEHICLES—Read the "Power Wagon" for reliable information concerning motor trucks, motor buses, motor cabs and other machines employed for business purposes. Issued monthly; single copies, 10 cents; \$1 a year. The most valuable paper of its kind published. The Power Wagon, Metropolitan Block, Chicago.

NEW and second-hand engines, transmissions, radiators, carbureters, mufflers, steering gears, timers, coils, springs and everything for the assemble. We also rebuild motors, repair cylinders with lost compression, frosted water jackets and radiators. Write for estimates. Address Auto Parts Exchange, 3702 6th Ave., Des Moines, Iowa.

SHINEBRIGHT METAL POLISH is absolutely the best on the market; sample and quotation furnished upon request. Shove & Gage Co., Inc., Providence, R. I.

FOR SALE—Pope-Tribune Model 4 touring car; 14 h. p.; first class condition and extras; price, \$250. Cash, L. B. 196, Tolland, Conn.

ONE G & J tires, new, 34x4, complete; sold machine; \$35. L. C. Hull, Winterset, Ia.

POPE-HARTFORD, 10 h. p., \$250. Reliance, side entrance, 20 h. p., \$350. Foster steam car, 78-in. wheelbase, \$150. For photographs and particulars address Lock Box 323, Barre, Vt.

TOPS—Until further notice, runabout tops \$20, touring car tops \$35. C. G. Meyer & Son, Tiffin, Ohio.



DURYEA'S BUGGYAUT.
—\$650.00. The simplest high wheel auto made. 2 cyl., 2-cycle, air-cooled, 12-15 hp. No gears, chains or ropes. C. D. Duryea, Reading, Pa.

CONCERN manufacturing automobile accessories is open to considering the manufacture of any specialty on royalty or otherwise. Address Box 2153, Boston, Mass.

A BARGAIN—\$1,450.00, Brand New assembled, four cylinder, 40 hp., touring car. Sliding gear transmission, 3 speed and reverse. Timken front and rear axles, and best standard material and workmanship. Beautifully finished. Value \$3,000.00. Need the money. S. Breakstone, 1712 Michigan Ave., Chicago, Ill.

PARTS BARGAINS—\$110.00, roomy, straight line, up-to-date, touring body, beautifully finished and designed. Full leather upholstery. \$30.00, radiator and hood, 30 hp., brand new. \$10.00, Kingston four-cylinder dash coil, used only for testing. \$3.00, choice of Kingston, Holley and Buffalo carbureters, 1 1/4 in. \$9.00, set of 4 touring car fenders. Brand new. \$16.50, 6 volt, 60 ampere lighting battery. New and guaranteed one year. List and description of these and other parts on request. S. Breakstone, 1712 Michigan Ave., Chicago, Ill.

FOR SALE—1908 Economy Motor Buggy, good as new, top, lamps, horn, complete \$200. 10 hp., two cylinder, air-cooled engine. Address S. A. Clark, Kimbolton, Ohio.

FOR SALE—Eiseman Magnetos, cheap. We have five four-cylinder Eiseman Magnetos and two six-cylinder Eiseman Magnetos in perfect condition, which we will dispose of at an exceptionally low figure if taken at once. Address "E," care of Motor Vehicle Publishing Co., Box 654 N. Y. C.

FOR SALE—(1) new, four-cylinder Kingston dash coil, \$15.00. (1) Two-cylinder, 10-12, air-cooled engine (new). List, \$150.00. Our price, \$75.00. 10 h. (new) Oldsmobile Runabout. List, \$650.00. Our price, \$400.00. 10-12 h. (new) Hobbie Accessible High-Wheel Car. List, \$750.00. Our price, \$500.00. 10 h. (second hand) Olds Curved Dash Runabout. List, \$650.00. Our price, \$250.00. (4) Excelsior Round Generators, with base-board bracket. List, \$10.00. Each, \$5.00. L. W. Hobbie, Hampton, Iowa.

A POSITION WANTED BY A YOUNG MAN as chauffeur; an experienced driver and repairman. Address Chester Ryder, Ruthven, Iowa.

FOR SALE—Snap. 1908 Lambert, surrity-type runabout, seats four people, 18 h. p. In fine condition. Guarantee does not expire until next August. Have ordered larger car. J. W. Ritter, Charleston, Ill.

TWENTY h. p. runabout; A1 shape; price 'way down; demonstration. C. L. Jones, Haskell, N. J.

FOR SALE—1908 Reo Roadster with complete equipment and in the finest order. Frank Page, Monticello, Iowa.

WANTED—Several late model motor cycles and runabouts. Cash and exchange. Address N. E. Ramsey, Lincolnton, N. C.

REAL ESTATE, SALE OR RENT—Long Island City, Borough of Queens. Good location for Garage, Hotel, Theatre or Office Building, 410 to 424 Jackson Ave., on Plaza facing entrance of Queensboro Bridge and 100 feet from boulevard connecting Thompson Ave. with plaza. Also plot on Thompson and Nott Avenues, entrance on both avenues. Apply John L. Klages, 37 Vernon Ave., Long Island City, or your own broker.

CHAUFFEUR, 23, American, total abstainer both liquor and tobacco; three years' experience; all repairing; country preferred; excellent references. Chas. B. Rowell, Middletown, N. Y.

STAY SHINY, THE MARVELOUS TARNISH PREVENTATIVE—One coat gives a hard, transparent finish to brass lamps, radiators, etc., that holds original polish for months. Guaranteed to stand heat and weather, \$2.00 per can, prepaid. Lasts a year. F. A. Schmoeger, Sterling, Ill. Agents make big profits.

FORD RUNABOUT, Model N, in very good condition; run but little; price \$400. Percival H. Smith, Bridgeton, N. J.

TO LET—Public garage at Wellesley Square; concrete fire-proof building, steam heated, rent low. Established business. Good opening to a man who knows the automobile business and will attend to it. Work enough on repairing bicycles as a side line, if desired. Apply office, 9 1/2 Grove Street, Wellesley Square, Wellesley, Mass. Telephone Wellesley 87-1. C. N. Taylor.

FOR SALE—Light, 4-passenger, detachable tonneau car; double cylinder, air-cooled, friction drive; like new; a bargain; \$350. H. M. Whitcomb, Albany, Wis.

WANTED—Second hand or a new 1904 Oldsmobile Touring Runabout Cylinder, 5 inch bore. Address P. Bare, 260 West York Ave., York, Pa.

THE SEATON SPRING WHEEL.

A good many attempts have been made to produce a spring wheel which should answer the requirements of resiliency, durability and lightness, but if the claims



The Seaton Spring Wheel.

of the makers of the Seaton Spring Wheel and of many who have used it are correct the problem has at last been successfully solved. In its basic principle the Seaton Spring Wheel is a wheel constructed of

two parts, an inner part or hub and an outer part which corresponds to the felloe and tire of the ordinary wheel, the two parts being connected by multiple springs set parallel to the axis with their ends held in brackets extending radially from the two main parts of the wheel. The springs, thus horizontally placed, are attached one end to the outer rim, the other to the inner rim alternately, and under tension, thus requiring each spring to take its full share of the load or shock at every point of the revolution, and at the same time producing a wheel which by actual test, possesses laterally more than four times its vertical strength.

The former objections to wheels of the spring type are stated as fully met in actual service by this wheel. There is no accumulation of mud and dirt. The continual vibration of the springs is constantly clearing them. The original cost is about the same as the ordinary type of wheels, while the up-keep is nominal, and the life of the solid tire at least five times that of the pneumatic tire, punctures and blow-outs aside. The rare breakage of one, or even several springs, only affects the action of the wheel in proportion to the number of springs in the entire wheel, and cannot put it out of commission; a broken spring can easily be replaced. The parts of the wheel are stout and simple in construction and are such as to stand all the tests that they might be called upon to undergo in long service.

Those who are interested should address for further information the makers, the American Wheel Company, 227 Williamson Building, Cleveland, O.

ELECTRIC LIGHTING FOR AUTOMOBILES.

There is a strong trend of popular opinion toward electric lighting for automobiles, according to reports received from various sources. The Willard Storage Battery Co. of Cleveland, Ohio, have made a special



"Elba" Car Lighting Battery. Manufactured by the Willard Storage Battery Co., Cleveland, Ohio.

study of automobile lighting by electricity. They are making the important point in their literature that only a lighting battery should be used for lighting purposes. The "Elba" battery, manufactured by this company, and illustrated herewith, is rated at the regular Pullman car lighting rate, which is about ten times higher than that of the ordinary sparking battery. Many owners who are attracted by the convenience and cleanliness of electricity make the mistake of attempting to get satisfactory results by overloading a sparking battery and forcing it to discharge at a much higher rate than it was designed or built for. The remedy is to install a sufficient



Lubrication Costs Less Than Repairs

Most of the bills for automobile repairs are really the costs of faulty lubrication in disguise. The grade of Vacuum MOBILOIL specially prepared for your particular car will give perfect lubrication and save time, trouble and money.

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is made in six different grades. One of these is the right grade for you. The requirements of your car have been exactly determined, and this grade of MOBILOIL prepared for it with scientific precision.

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Mr. Dealer and Owner: Have you ever thought that to make a good repair you have got to have the correct article? You can get it in our Patches. They are made to absorb the cement, and have a heavy center and feather edge. Can be obtained from all jobbers.

**C. O. TINGLEY & CO.,
RAHWAY, N. J.**

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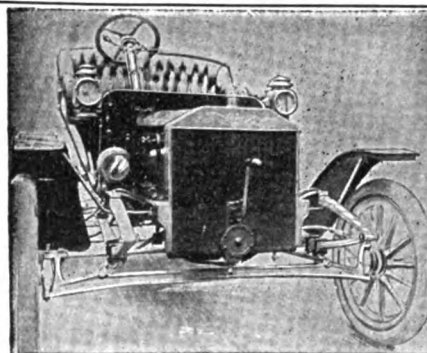
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Patents Pending.

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The difference in the riding and operating qualities is noticeable at once, and the surprise is a delight.

The safety of the outfit over the single spring cannot be figured in dollars and cents.

The greatly improved appearance is striking and produces favorable comment. **HUNDREDS ALREADY SOLD.**

Brackets and perches are now made of Vanadium steel with a tensile strength of more than 140,000 lbs.

Springs are the finest quality, tempered in oil, and carefully tested.

Finished, painted and carefully packed in wood box.

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NEWEST RELATIVE OF THE "EXCELSIOR."

Underneath the square semi-steel body is fitted our special gas burner, thus doing entirely away with boiler for inner tube work.

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powerful battery and the "Elba" will meet all requirements. The Willard Storage Battery Co. also manufacture the latest type of Tungsten lamp. In this lamp a larger proportion of light is obtained by sub-dividing the filament, thereby increasing the surface of light production. For complete particu-

lars regarding both the battery and the light write to the Willard Storage Battery Co., Cleveland, Ohio, and mention this journal.

LIGHTNING BATTERIES.—In this issue the Lightning Electric Accessories Company, 1712 Michigan Avenue, Chicago, Ill., have an announcement of their spark and light-

ning batteries, which they guarantee for a year. With these batteries they say there is no corroding or slopping over or leaking of solution. Write for catalogue giving full particulars together with prices and mention **THE AUTOMOBILE DEALER AND REPAIRER.**

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It heats quickest of any vulcanizer on the market.

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C. A. SHALER CO., Box X, Waupun, Wis., U. S. A.

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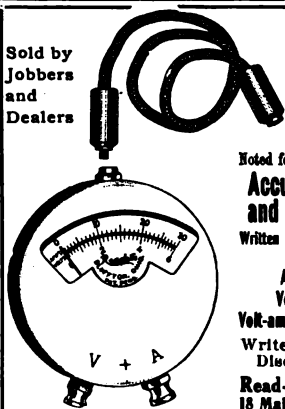
Touring Automobilists and others will find that C. S. Mendenhall, 512 Race St., Cincinnati, is the publisher of the best and most comprehensive list of maps of states that exists. He issues maps of comparatively all states where cars are driven to any great extent and they are unusually well printed, and accurate. Of course, roads are constantly changing from bad to good and from good to bad, but these maps contain the latest information of the good, bad and indifferent highways available, and they really answer the purpose excellently. The price of the maps of each state is 75 cents. They are all specially designed and bound in pocket form for the use of Touring Automobilists, Cyclists and Wagon Road Travelers. While they show the best roads, in the majority of cases a distinction is made between the Main Touring Routes and Local Routes, either by a distinct coloring or other special marking. Each map is carefully drawn to a scale which makes it easy to ascertain distances between all given points.

THE AMCO BUMPER.

It is reported that an injunction has been granted restraining the Appliance Manufacturing Co. from either manufacturing or selling the Amco bumper. While the Turner Brass Works, licensees of the above patent, desire to avoid litigation, they say they will defend their patent and start suit against all infringers of the Harroun patent.

The New York City office of the Hoyt Electrical Instrument Co. of Penacook, N. H., has been removed to 136 Liberty St., where the company will have greatly

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Booklet.

Universal Fluxine Co., Urbana, Ohio

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The porcelain used in their manufacture is of a special heat-proof composition. No breakage. Assured ignition.

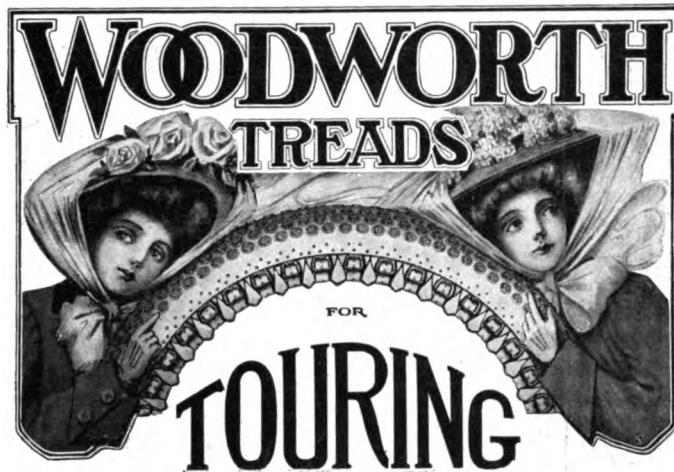
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Cost less than one-half as much per mile of usage as tires.

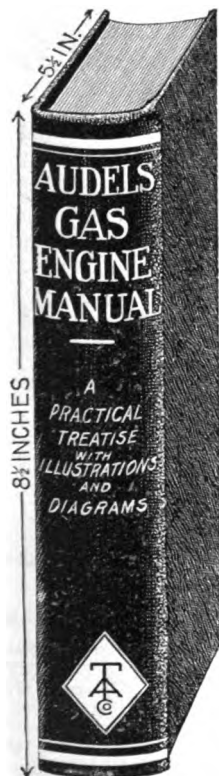
Woodworth Treads are the only Tire Protectors which guarantee freedom from punctures, cut or torn tires, skidding and slipping, entirely without injury to the rubber tire.

Certain firms have manufactured so-called Tire Protectors which fasten to the rim. They should have known better. Such Treads tear themselves from the rim or grind the rubber shoe into lint. They might more fitly be termed Tire Destroyers.

Insist upon having Woodworth Treads. Write for reasons.

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New York Store, 1650 Broadway. Chicago Branch, 477 Wabash Ave.

AUDEL'S GAS ENGINE MANUAL, \$2.00



THIS volume, just published, gives the latest and most helpful information respecting the construction, care and management of **Gas, Gasoline and Oil Engines, Marine Motors and Automobile Engines**, including chapters on **Producer Gas Plants** and the **Alcohol Motor**.

The work is divided into 27 Chapters as follows:—Historical Development—Laws of Permanent Gases—Theoretical Working Principles—Actual Working Cycles—Graphics of the Action of Gases—Indicator Diagrams of Engine Cycles—Indicator Diagrams of Gas Engines—Fuels and Explosive Mixtures—Gas Producer Systems—Compression, Ignition and Combustion—Design and Construction—Governors and Governors—Ignition and Igniters—Installation and Operation—Four-Cycle Horizontal Engines—Four-Cycle Vertical Engines—Four-Cycle Double-Acting Engines—Two-Cycle Engines—Foreign Engines—Oil Engines—Marine Engines—Testing—Instruments Used in Testing—Nature and Use of Lubricants—Hints on Management and Suggestions for Emergencies—The Automobile Motor—Useful Rules and Tables.

Each chapter is illustrated by diagrams which make it a thoroughly helpful volume, containing 512 pages, 156 drawings, printed in large clear type on fine paper, handsomely bound in rich red cloth, with gold top and title, measuring 5½x8½ inches and weighing over two pounds.

The book is a practical educator from cover to cover and is worth many times the price to any one using a gas engine of any type or size.

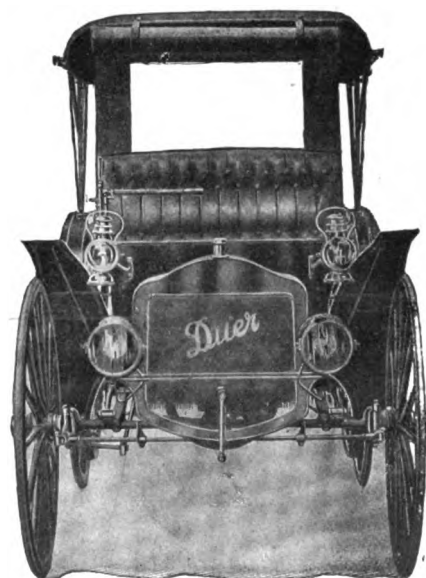
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Send for "MISSOURI PROOF"—we show you—and our 1908 BOOKLET—it's interesting.

Beware of worthless makeshift single or double coil imitations and infringements.

Liberal NO RISK propositions to the trade.

WHAT OTHERS SAY:

"100,000 miles and not a broken side spring."

C. W. NUGENT, St. Louis.

"Am thoroughly satisfied with them."

E. W. GIBSON, The Point, Tasmania.

"They ride extremely nice."

BRITISH-AMERICAN CO., Coventry, England.

"I cannot praise them enough."—H. L. TURNER, Boston.

"They are everything you claim for them."

Dr. F. E. BUCK, Jacksonville, Fla.

"I cannot understand how I did without them."

LEOPOLD KAHN, New York City.

"Make the car ride very comfortably."

S. N. BRIGGS, Los Angeles, Cal.

The above extracts from a select few letters recently received give an idea of the range of territory in which the Supplementary Spiral Springs are popular. We have too many to print.

ST. LOUIS SUPPLEMENTARY SPIRAL SPRING CO., Inc.

Main Office and Factory, 4528 Delmar Ave.
ST. LOUIS, MO.

NEW YORK OFFICE, Motor Mart Bldg., 1876 B'way, Room 202.

BOSTON, 889 Boylston.

CHICAGO, 1218 Michigan.

PACIFIC COAST, 424-446 Stanyan Street, San Francisco.

Carburetor Troubles

OUR DELIGHT.

Don't tell them to the policeman. Cussing vile smelling exhaust smoke hasn't made an expert of him. Every Dealer knows that a great number of cars (some high-priced ones) have cheap, ill-adapted carburetors.

THE VICTIMS DON'T LIKE IT.

They come to you, Friend Dealer, for help, and if you couple them up to one of our

BALANCED-FLOAT CARBURETORS

They will enjoy motoring well enough to buy a lot of "Luxury trimmings" that you can sell at a profit.

They will burn less fuel, get more speed, and get it anywhere; not even a Corduroy road "phases" the Balanced-Float Gasoline Control. MONEY BACK IF IT FAILS. Tell us you are "A Live One." We will do the rest. CATALOGUE FREE.

"WATT-DETROIT" CARBURETOR CO.,

68 CRISWOLD STREET, DETROIT, MICH.

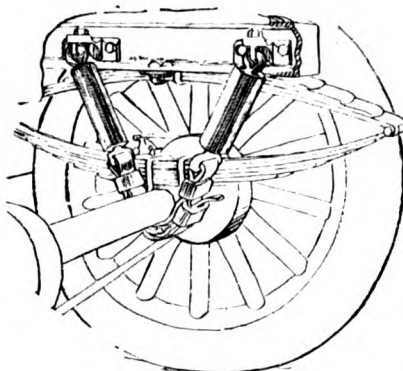
THE AUTO AIR CUSHION. SHOCK ABSORBER.

More Comfort
More Miles
More Pleasure

No Broken Springs
No Skidding
No Lost Power

Less Trouble
Less Worry
Less Money

All Roads Look Alike
With the
Air-Cushion Attached.



No holes to drill in frame, our adjustable clamp will fit any pressed steel frame. A wrench and ten minutes time are all that are required to install the Air-Cushion.

For light runabouts, \$10 per pair, \$20 per set of four.

For heavy runabouts, \$12 per pair, \$22 per set of four.

For touring cars, \$15 per pair, \$25 per set of four.

Mellen-Edwards Co.

405 E. Grand Ave., Beloit, Wis.

DIXON'S Motor Graphite

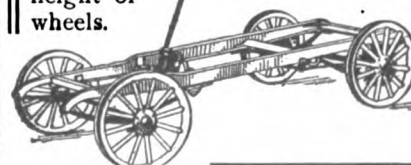
is being more widely used every day. There is no substitute for it. Saves wear, time and trouble. Write for a free sample and descriptive booklet.

Joseph Dixon Crucible Co.

JERSEY CITY, N. J.

AUTOMOBILE

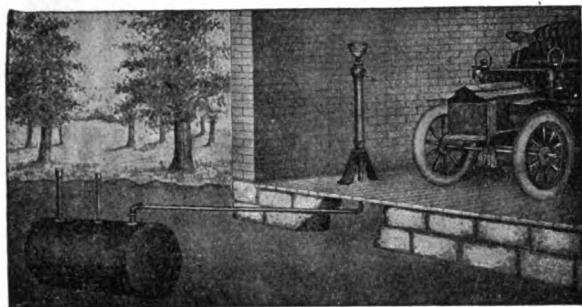
Running Gears, with pressed steel or angle iron frames, also chain or shaft drive. Any wheel base up to 138 inch, and any height of wheels. ALSO ALL KINDS OF BODIES



WRITE FOR OUR NEW CATALOG AT ONCE.

BORBEIN AUTO CO.,

2109 & 2111 N. 9th St.,
ST. LOUIS, MO.



THE underground outfit herein shown is intended to be practicable rather than elaborate. **FIRST CLASS** material and workmanship at a low price. The tank is heavy galvanized iron connected to pump with twenty feet of $\frac{1}{4}$ -inch pipe. Pump is made of brass and iron, all wearing parts being brass, and has no leather or rubber packing to wear out. It is a plain lift pump and is intended for use only where the oil does not have to be lifted over eight feet from bottom of tank to spout of pump, and the horizontal pipe is not over thirty feet.

This outfit, complete, consists of

- One tank
- One pump
- Three feet of $\frac{1}{4}$ -inch filler pipe and cap
- Three feet of $\frac{1}{4}$ -inch vent pipe and cap
- Twenty feet of $\frac{1}{4}$ inch pipe
- Two $\frac{1}{4}$ -inch elbows

Send at once for Descriptive Circular and Price List

The Wilson & Friend Co.

MANUFACTURERS

3136 So. Canal St., Chicago, Ill., U. S. A.



Friction Transmission Chain-in-Oil Driven.

The Cartercar is in a class of its own for simplicity. It has but few parts.

The annoying features of other cars are eliminated with the Cartercar patented Friction Transmission and patented Chain-in-Oil Drive.

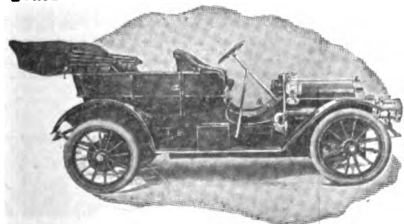
There is no clutch—no gears—no water pump—no fan—no universal joints—no shaft drive—no bevel gears—no

grease packings—no noise—and only one control lever.

The Cartercar will climb a 50% grade with five passengers.

A boy can drive and care for it as well as a man.

Write, if you are interested, to Pontiac, Mich.



\$1,350.

\$1,350.

Make Money Easy With These Sundries

It's easy for you to make **more money** selling the Goodyear Tire & Rubber Company's Tire Sundries and Repair Materials. Note these two vital reasons: They sell easily in the first place because the name **Goodyear** guarantees to the consumer that they are the best on the market.



Repair Kit No. 2

And then your sales **repeat** because the user is **pleased** with the service they give him—with their usefulness. He not only returns to buy again but he tells others **where** he got such satisfactory Sundries and Repair Materials.

Note How Necessary to the Autoist

Repair Kit No. 2 is most saleable—at a price reasonable to the consumer. It is a complete outfit for repairing Auto Tubes, containing six assorted Inner Tube Patches, two tubes C-35 Cement, Emery Paper, Valve Caps, Valve Insides, Valve Nuts and Washers, all neatly packed in tin box. Retail price \$1.00.

Reinforced Blowout Patch

A small Fabric Patch, heavily reinforced, to repair fabric breaks inside the Casing. Patches have a frictioned surface on one side to make them adhere firmly to casing. Other side is bare fabric which won't stick to tube. Retail at 30 cents each.



Inside Tire Protector

New Life for Old Tires

Here is a cracker-jack seller. Everybody wants to get more wear out of old tires. The Inside Tire Protector will enable the user to secure **big additional mileage** from old tires practically worn out. It is made of four plies of fabric moulded to fit the inside of the casing. Great in repairing or preventing blowouts. Prevents the Inner Tube from being pinched in fabric breaks. Should not be used on new casings as it increases heat and friction. Comes in all sizes, from size to fit 28x3 tires at \$6 each, retail, up to 36x5 tires at \$13, retail.

Tire Plaster and Inner Tube Bag

Here you have two very useful specialties. The Tire Plaster is made from two plies of frictioned fabric with 3-ply heavy fabric reinforcement between. It has a flap on either side to fit around the bead of the tire and repair a rim-cut. At the same time, the heavy reinforcement will repair any ordinary blowout. Three sizes, 50c or \$1.00 or \$1.25, retail, for all size tires from 2 $\frac{1}{2}$ -inch to 5-inch. Extra tubes carried in Goodyear Inner Tube Bag won't come in contact with oils, greases and sharp tools. Nor can tubes be chafed through from shuffling about in car. Bag made of frictioned fabric—waterproof. Holds two or three tubes, according to size. Retail, 80 cents each.

See this Rim-Cut Patch!

NEW, BUT—
Already a Big Seller

Just new this year, this patch is already one of the best selling propositions we have. There is nothing made just like it. Of best frictioned fabric, heavily reinforced and cured in shape to fit inside the Casing. Provided with a fabric flap that fits around the bead of the tire, holding Patch firmly in place—protecting any rim-cut which may have developed. Heavy reinforcement also takes care of and repairs blowouts perfectly. In three sizes, for all sized tires. Retail, 50c or 65c or 85c. Just write for price list and our book, "Care of an Auto Tire." Then you'll **KNOW** how repairs that will **stay repaired** are made.



Rim-Cut Patch

The Goodyear Tire & Rubber Company

Sprague Street, AKRON, OHIO

Branches in Principal Cities

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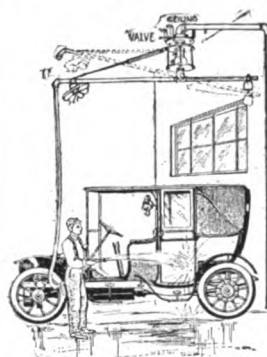


A few sections on a weak spot or blow out does the business.
WALKER AUTO TIRE BAND CO.,
 18 to 24 S. East St.. INDIANAPOLIS, IND.

Walker Auto Tire Bands
 Metal Tread. Sectional Protector, and Plain Band Blowout Patch. Better than the Best.



Irving Overhead Vehicle Washers



Ever Ready Washer
 A Cheap but Efficient Washer

Irving Washer No. 1

Without Illumination

Irving Washer No. 2

With Electric Light Attachment

Irving Indestructible Washer No. 3

With Automatic Water Cut-off

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With Automatic Water Cut-off and Electric Light Attachment

THE I. J. SMITH MANUFACTURING CO.

Incorporated

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Mfrs. of the largest line of Overhead Washers. Send for Catalog A.



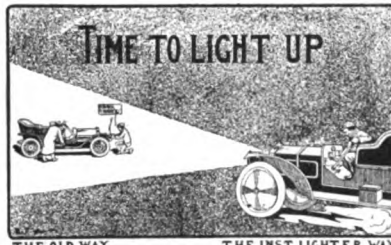
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TIRES

Have been successfully used for past five years on every make of pleasure car
PUNCTURE-PROOF, DURABLE, RESILIENT

Designed to replace inflated tires; as easy riding as properly inflated pneumatics. From 3 to 5 times as durable. Fit any standard clincher rim, easily applied with free hand tool. Adopt these tires and you will enjoy your car in a manner never before possible with inflated tires.

Details in Catalog No. 5.

Swinehart Clincher Tire Co., Akron, O.
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THE OLD WAY THE INST LIGHTER WAY.

PATENTS PENDING.

Used with a gas tank—no matches—no adjustment of gas—a delightful convenience—never fails—Your dealer can install it for you. Price \$25.00 installed. Giving perfect service on thousands of the best cars. When buying a new car be sure to order the Inst Lighter put on at the factory. It saves its cost in gas in less than one season. Fully Guaranteed.

TESTIMONIAL.

The Inst Lighter Co., Columbus, Ohio. Columbus, O., May 11th, 1909.
 Gentlemen:—The Columbus Fire Department has equipped its three automobiles with the Inst Lighter. It is quick to operate, and can be operated when the car is in motion as well as standing, which is a very important point in fire service. The Lighters have been in service for the past four months, during which time they have given the best of satisfaction. Yours very truly, (Signed) C. J. LAUER, Chief Columbus Fire Dept.

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THE INST LIGHTER COMPANY, COLUMBUS, OHIO

LIGHT
 Your Gas Lamps by turning a gas cock and an electric switch, both located on the dash of your car where you can reach them without stopping or GETTING OUT

GET THE INST LIGHTER

Thermoid

BRAKE BAND LINING

WEARS INDEFINITELY
 SOLD BY ALL FIRST CLASS DEALERS

Manufactured by TRENTON RUBBER MFG. CO., Trenton, N. J.

STOP!
 NO TIRESELE
 OVER HERE



PUNCTURE AND POROUS TIRE TROUBLES OBIATED INSTANTLY

INCREASES LIFE OF TIRES

REDUCES GREATLY CHANCE OF BLOWOUTS

NO SPARE WHEELS NECESSARY

ABOVE CLAIMS GUARANTEED

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TIRESELE
 NO GUM



THE BUFFALO ELECTRIC VULCANIZER

\$10.00

Will enable you to REPAIR YOUR OWN TIRES.

THREE TIMES THE LIFE.

A NECESSITY FOR EVERY AUTO OWNER.

\$10.00

FREE

Send for our Booklet "TIRE TROUBLES," with description of Vulcanizer, to-day.

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BUFFALO, N. Y.

329 ERIE CO. BANK BLDG.,

4X4 AIR COOLED MOTORS

\$80.00 each for July only.

Transmissions,
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"Knipe" Pat.
Ball Bearings.

1/4 Inch Shaft and Up.
 No Fitting. Just Push Them On.
 10 Cents in Stamps for Sample.

PRESSED STEEL MFG. CO.,
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Steel } Balls.
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AUTOMOBILE SPRINGS

All Styles.

Made or duplicated by

TUTHILL SPRING CO.

221 W. Polk Street, - - CHICAGO, ILL.



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HOW MUCH DID IT COST YOU

last year for inner tube punctures? A great deal, didn't it?

Why not save all this expense by carrying an

M. & M. QUICK REPAIR OUTFIT in your tool kit.

Repairs made anywhere—on the road or at home, and you don't need to be an expert to use it. Just follow directions and you will be surprised how easy repairs can be made that have been costing you from 50c. to \$2.00. With each outfit you can make about \$20.00 worth of repairs. Start now by curtailing expenses, and repair your own punctures.



IMITATIONS are many, but they fail to do the work. Insist on M. & M. If your dealer does not carry it in stock, send his name and

\$1.00 For Our Outfit Prepaid.

Manufactured by

THE M. & M. MFG. CO.,

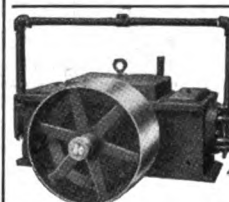
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"NOFLUX" ALUMINUM SOLDER



does the WORK and does it right. Send 25c. or 50c. for sample bars. (Full description and direction sheets free.) Joins aluminum to aluminum and to other metals perfectly. Saves your broken Auto Castings and loss of time waiting for parts. Thousands of pleased users.

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AIR COMPRESSORS

Patented

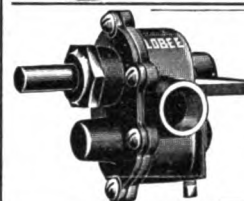
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Weight 200 lbs., a real machine, not a toy.

Also other sizes.

Send for Descriptive Circular and Price List

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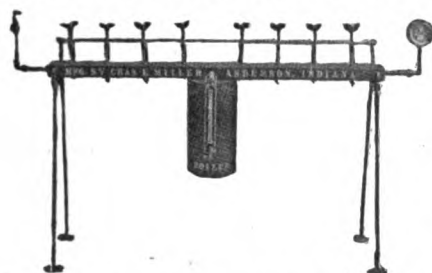


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LOBEE PUMP AND MACHINERY CO.

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MILLER'S INNER TUBE VULCANIZER.



Has a tube plate 54 in. long and 4 in. wide with plain surface highly polished, complete with stand, 12 flue boiler, gas or gasoline burner, water glass, pop valve, steam gauge, 8 clamps and two molds for curing the treads of casings, price \$30.00 Tube plate only with steam gauge and 6 clamps, price \$10.00.

We also manufacture various other vulcanizers. No. 1 and No. 2 adjustable sectional vulcanizers, complete with boiler, \$35.00 each. Bicycle vulcanizers, \$7.50; Motor cycle vulcanizers, \$12.50; Tread Rollers, \$12.00; Kettles, \$115.00; Power wrapping machines,

\$175.00 each. Also special round molds with flush joints for splicing Inner tubes. We do all kinds of tire repairing and carry a large stock of tires at reasonable prices. If further interested in vulcanizers write for catalog and special proposition.

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GASOLINE STORAGE UNDERGROUND OUTFITS

\$12.50, \$25.00, \$35.00 and up.

GOOD GOODS. LOW PRICES.

LUBRICATING OIL TANKS ALSO.

\$3.50, \$5.25, \$6.50, \$10.00 and up.

Cabinets, \$15.75 to \$100.00.

Oily Waste Cans, meeting insurance requirements

Accurate Measures, and good funnels.

Kamp Kook's Kits that please tourists

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LIGHTNING



Sparking and Lightning Batteries.

Guaranteed 1 Year.

No corroding at binding posts. No slopping over or leaking of solution. Made of the right stuff and by those who know how. 6 volt, 60 ampere, \$12.50; 6 volt, 80 ampere, \$12.50.

Write for complete catalogue on batteries, lighting outfits, electric lamps, etc.

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An excellent thing for removing grease, dirt, etc., from the hands. Contains no acid or other injurious substances. Price, 10c. per can. Discount to dealers.

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Tops That Fit.

We guarantee all tops to fit, not to sag or crack. A high grade top at popular prices. Send postal stating Model and receive samples and quotations.

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MAPS AND GUIDES FOR AUTOMOBILISTS.

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Brass Tube Shield WITH Fly Screen

No. 8 Seat, \$4.50

at lowest prices. 5 Styles of revolving Seats for Autos or Boats. All seats have spring cushions. Also Bodies, Tops and Cushions.

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PACKARD CABLE



Will Make That Repair Job SURE. Are you getting our pretty Monthly Calendars? THE PACKARD ELECTRIC CO., Warren, Ohio.



Gun Filled and Emptied in 30 Seconds
MILLER & STARR
250 Greene Street - Brooklyn, N. Y.



F. W. Ofeldt & Sons,
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Manufacturers of
Blue Flame Kerosene Burner,
Safety Water Tube Boiler,
Automatic Water Regulator,
Automatic Fuel Regulator,
Feed Water Heater,
Compound Steam Engines,
New Automatic Fuel Feed.
For all makes of steamers, including White's and Stanley's. Write for new Catalogue.

Eastern Self-Measuring Pump

Our 1907 Model, shown herewith, will quickly pay for itself in any garage.

**Convenience,
Economy,
Safety.**

Not one drop of Gasoline wasted.

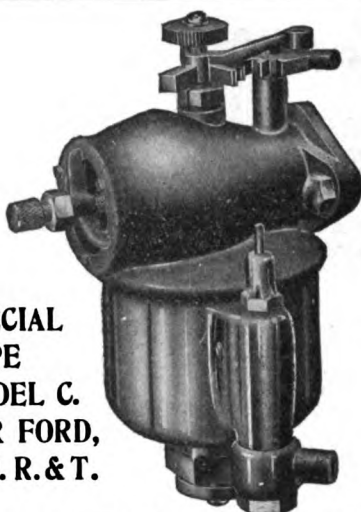
**Gasoline Tanks,
Pumps,
Complete
Storage
Outfits.**

Get full information by writing to

Eastern Oil Tank Co.
Lowell, Mass., U. S. A.



SPECIAL TYPE MODEL C. FOR FORD, S. N. R. & T.



This, a type made specially for this car, is easily attached and adjusted; no fitting required. Gives more power. Finest throttle control at all speeds. Saves gasoline and runs engine cooler. Is giving satisfaction in cases where four different makes had been tried before ours. Low in price, but high in quality. Satisfaction guaranteed or price refunded. Send for 1909 catalog.

HEITGER CARBURETER CO.

INDIANAPOLIS, IND.
212 WEST SOUTH ST.

Prest-O-Carbon Remover



**CLEAN
OUT
YOUR ENGINE
WITH**

PREST-O-CARBON REMOVER.

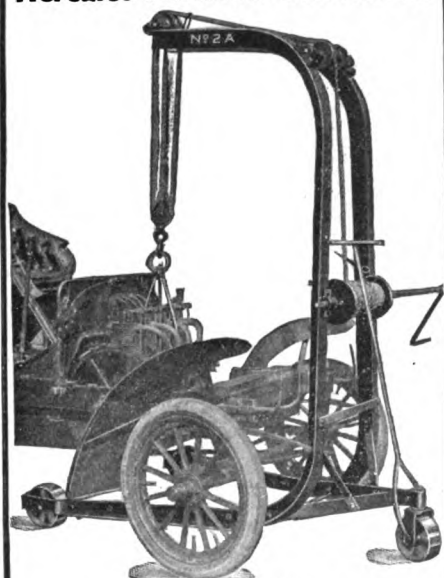
Thousands of engines are ruined every year by being torn to pieces and scrapped besides costing \$15 or more. **Don't Do It.** We positively guarantee that **Prest-O-Carbon Remover**, injected into the cylinders according to directions, will dissolve every particle of carbon, and **INCREASE** the **POWER, COMPRESSION, DURABILITY** of your engine. No injury to the metal.

One quart at \$1.00 will do the work. You can do it yourself. Our reputation is back of this.

Gal. \$3.75 ½ Gal. \$2.00 1 qt. \$1.00

PREST-O-LITE CO.,
251 South St., Indianapolis, Ind.

Hercules Portable Crane Hoist

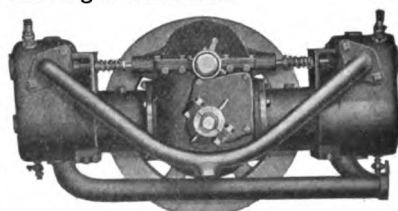


Patented December 19, 1905
See how easy it does it. Fills the bill for Automobile Factory and Garage Crane. Many of them using it. You should. Send for descriptive circular.
WILLIAM S. NICHOLLS, Hoosic Falls, N. Y.

The Beilfuss Double Opposed Motor

Makes a hit wherever used on account of its compactness.

Can be placed in any car from the small Olds Runabout to the larger sized cars.



Made in two sizes:
10-12 H. P. and 18-20 H. P.
Water Cooled.

Write to day for Circular and Prices.
Simplest and Strongest Motor Built.

Beilfuss Motor Co.
LANSING, MICH.

Please mention the Auto Dealer and Repairer



Here is ECONOMY

in tires that keep nails and anxiety out and that hold air and confidence within. You never saw their like, for they have a renewable tread, steel studded. Put a new tread on next season if you wear out the first one this year. Unless you prefer tires that cost as much, skid, puncture and blow out, better ask us about Economy Tires. They are not that kind.
BEEBE-ELLIOTT CO., - Racine, Wis.

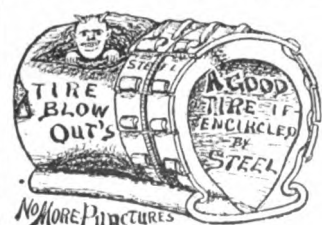
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MOTOR VEHICLE PUBLISHING CO.,
24 Murray St., New York.

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PROTECT YOUR NEW TIRES. REPAIR THE OLD ONES.

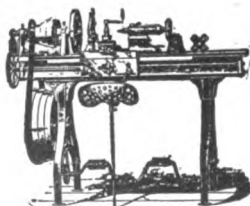


Tires
Will Last
Forever

Steel Link
Bands

Hooks to
Rim

You can fix Blowout quick. If tire is completely covered by these clasps you cannot have Blowouts, Punctures, Rim Cuts or Wearing off of tire. (Any old tire is good. How can it get away if encircled by steel?) As flexible as ever. Anti Skid.
KIMBALL TIRE CASE CO., 174 Broadway, Council Bluffs, Ia.
Agency for Indiana, 417 Mass Ave., Indianapolis.



THE BARNES LATHES

9" swing
11" swing
13" swing

For Repair Work our No. 13 Lathe is right; has 13" swing, auto cross feed, length of beds from 5 to 10 feet long; furnished with counter-shaft or foot-power.

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206 Ruby St., - - - Rockford, Ill.

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30x24	13.25	8.50	3.35	2.75
30x4	31.80	17.50	6.40	4.75
31x4	32.50	18.00	6.65	4.50
32x3	16.80	10.50	4.15	3.25
32x34	24.60	15.00	5.50	3.50
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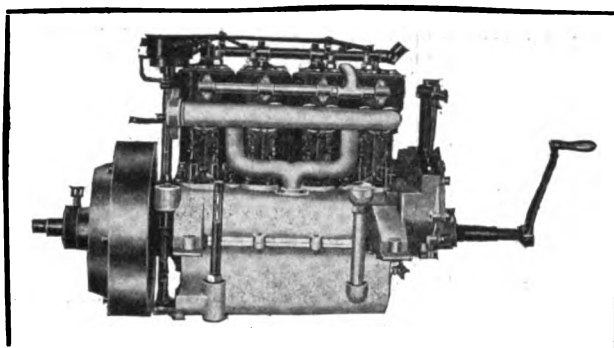
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THE "KIRKHAM MOTORS"



Model "M-4" 20 H. P. RESULTS

The **KIRKHAM** Motor was used in the most economical water cooled car in the Long Island Auto Club Economy Contest, Feb. 25th, 1908, carrying five passengers 246 miles on 12 gal., 3 pts. gasoline. Weight of car, 2100 lbs.

In the Harrisburg, Pa., Motor Club Endurance Run, May 4th and 5th, the **KIRKHAM** Motor was used in the only gasoline car to make a perfect score out of 26 starters.

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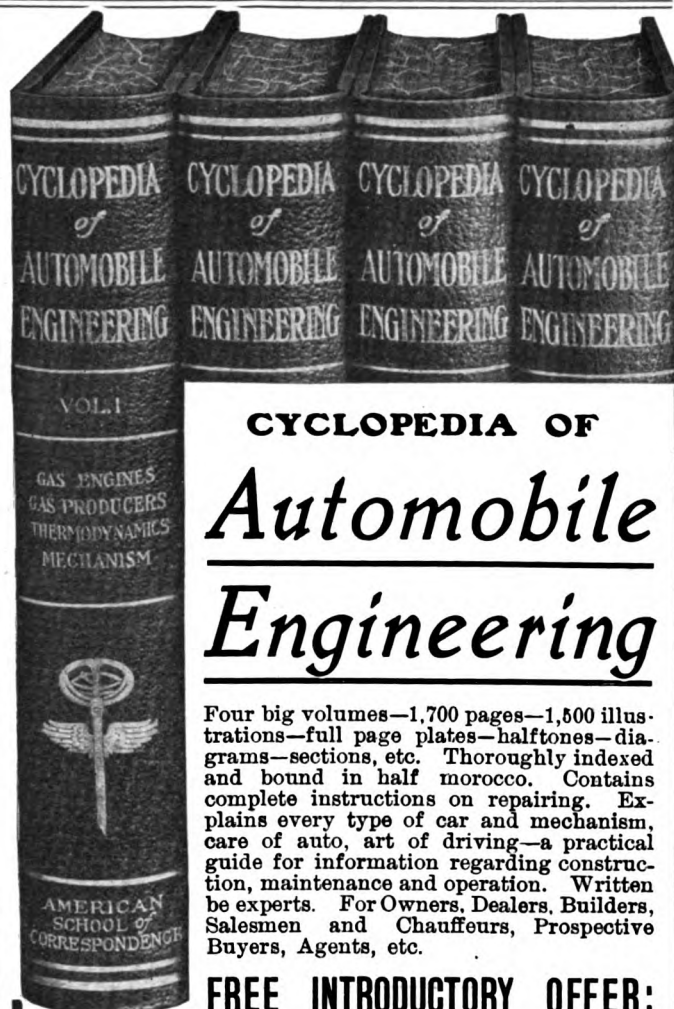
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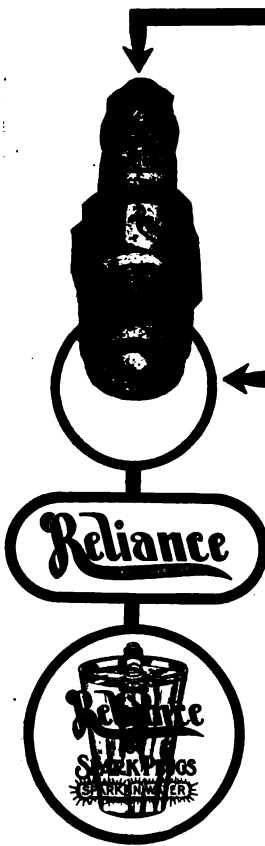
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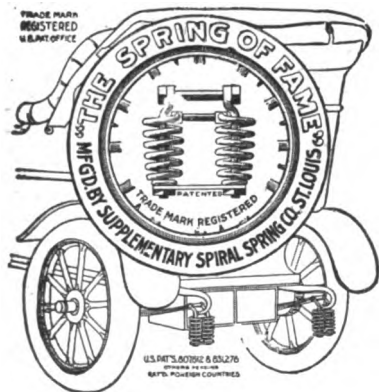


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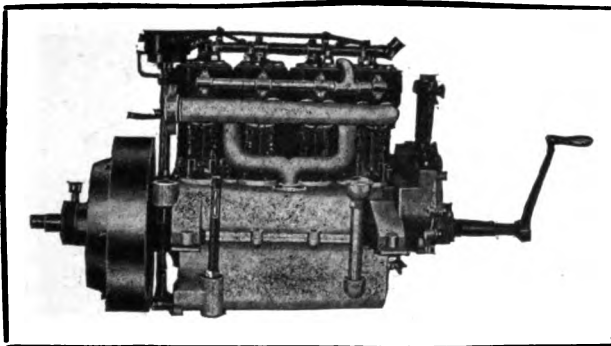
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THE "KIRKHAM MOTORS"



Model "M-4" 20 H. P.

RESULTS

The **KIRKHAM** Motor was used in the most economical water cooled car in the Long Island Auto Club Economy Contest, Feb. 25th, 1908, carrying five passengers 246 miles on 12 gal., 3 pts. gasoline. Weight of car, 2100 lbs.

In the Harrisburg, Pa., Motor Club Endurance Run, May 4th and 5th, the **KIRKHAM** Motor was used in the only gasoline car to make a perfect score out of 26 starters.

Now, does this make you want to know more about these motors? Catalog.

The Kirkham Motor, Bath, N. Y.



GOOD profits are only *half* the results of **RED HEAD** sales.

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The Cartercar is in a class of its own for simplicity. It has but few parts.

The annoying features of other cars are eliminated with the Cartercar patented Friction Transmission and patented Chain-in-Oil Drive.

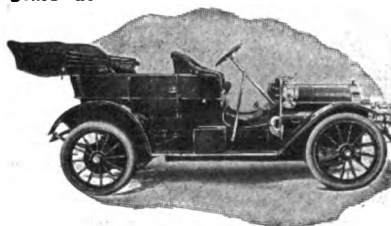
There is no clutch—no gears—no water pump—no fan—no universal joints—no shaft drive—no bevel gears—no

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**More Power—More Uniformity—
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When properly attached to your old carburetor, it adds the following

Important Features:

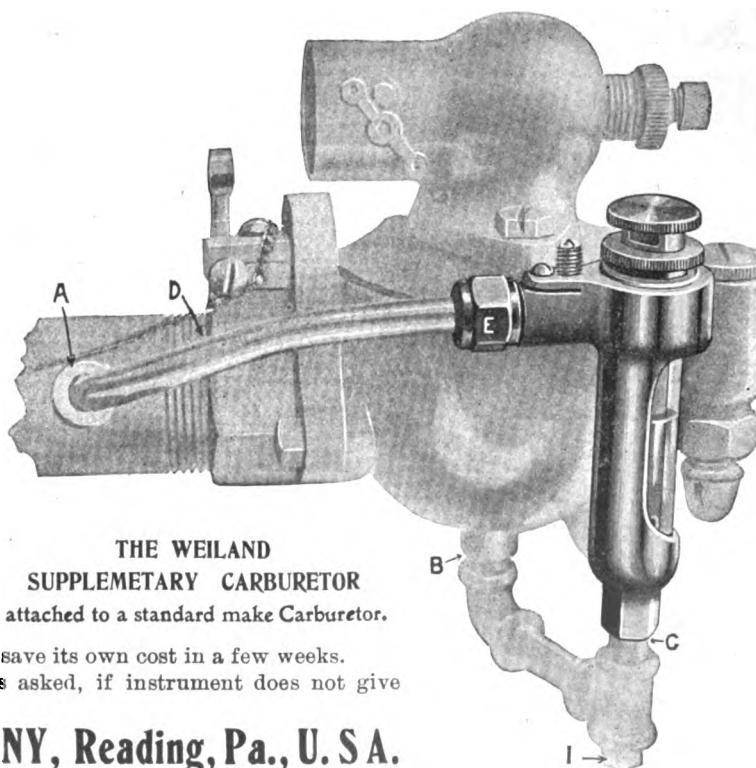
1. It makes your old carburetor self-priming without waste of fuel or dripping of gasoline.
2. It starts your cold motor, even in freezing weather, on the first complete cycle without any attention.
3. The simple closure (not opening) of the throttle, on stopping your motor, will make your engine almost sure of starting on the spark.
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6. It will make your engine develop 5 to 25 per cent more power, as shown by better pulling on hills and more speed on the level.
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VOL. VII., No. 5.

NEW YORK, JULY, 1909.

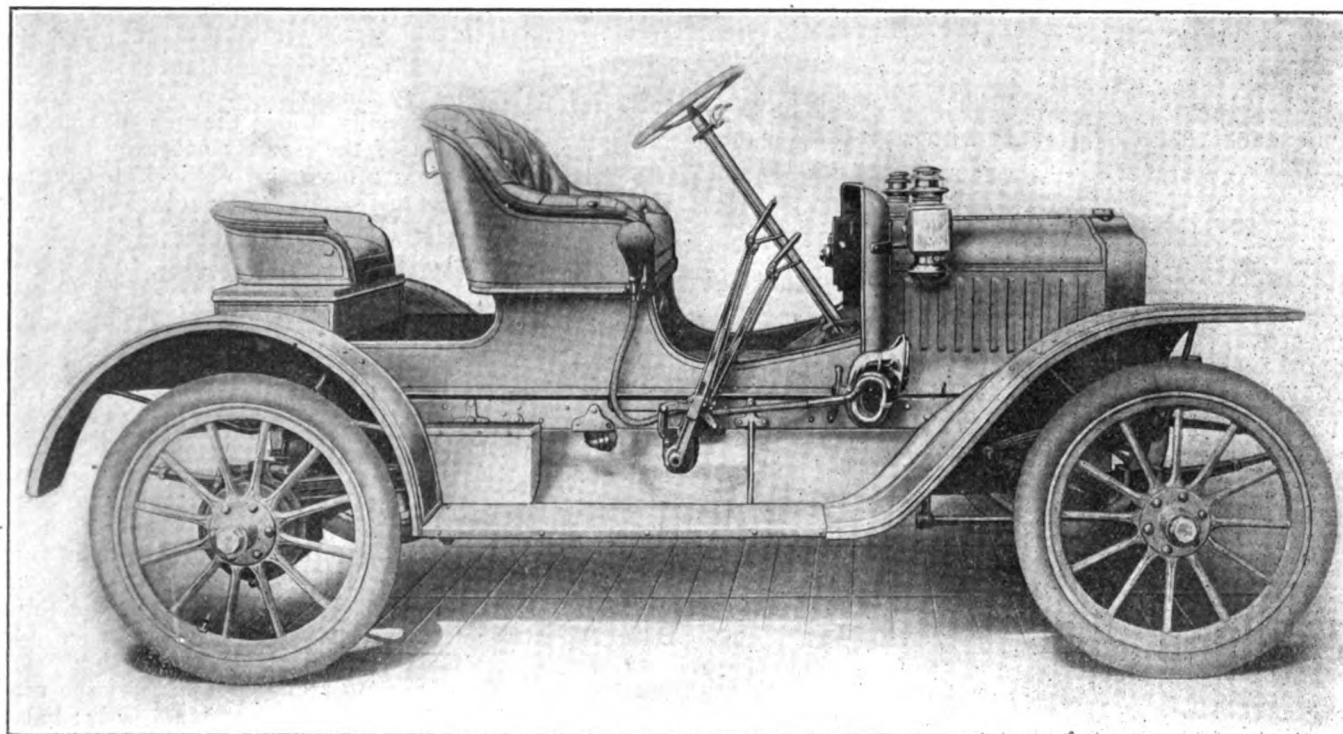
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Since the beginning of the automobile industry each season has ushered in some new car that has set a standard for high quality and low price. The Maxwell-Briscoe motor Company has just made public the specifications of a new four-cylinder, 22 HP. runabout to be known as Model Q. For the past year it

The motor is of the four-cylinder vertical type, dimensions being $3\frac{3}{4} \times 4$ inches. The cylinders are cast in pairs, the motor developing 22 actual horse-power at normal speed of 900 R. P. M. The water jackets are cast integral with the cylinders, and the valves are interchangeable and exceptionally large. The crank shaft is of a special steel drop forging and finished by grinding. The transmission is of the sliding-gear type giving three speeds forward and one reverse, direct drive being on third speed. Roller bear-



With rear seat for one, price \$875 With rear seat for two, price \$900. Without rear seat, price \$850. Equipment—three oil lights, horn, tools, etc.

has been rumored that this Company would produce a sensation in a four-cylinder runabout to sell at less than \$1000 and the specifications which are now printed for the first time point to the fulfilment of these predictions.

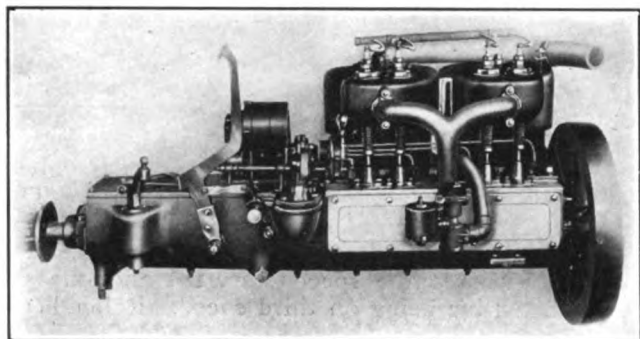
A special feature of this new runabout is that it is equipped with a sliding-gear transmission giving three speeds forward and one reverse. This type of transmission, while used almost exclusively on large cars has been considered heretofore too expensive to put on an automobile selling for less than \$1000. Heretofore runabouts selling at approximately this price have been fitted with planetary transmissions.

This new model will be equipped with a magneto, a set of dry cells also being provided for emergency use. The new car is put out in three styles of body, namely, the standard runabout type, having individual front seats with tool and carrying box in the rear; with a rear seat for one; and with a rear seat for two.

ings of the latest improved type are used throughout. The gears are drop-forged from special steel carefully cut and hardened. The oil is carried in a tank located under the hood; from this is forced through a single sight feed located on the dash from whence the oil is distributed to each cylinder and to the clutch compartment. Two sets of brakes of the internal expanding and external contracting type are mounted on the rear hubs. Thorough protection to the engine and transmission from mud and dust is afforded by a pan extending from the radiator to the rear end of the transmission. Metal extensions are also provided from the frame to the running board and from the frame to the fenders, so that the car can be driven through deep mud without splashing the body or the passengers. Throughout the entire motor simplicity and strength are the dominant features.

When the writer was at Tarrytown he had the opportunity of having a long spin in one of these new

models. The car behaved admirably and showed a surplus of power on hills. Unlike most light cars this new model holds the road fully as well as the heavier cars. On one or two level stretches we were able to put the speed indicator slightly beyond the fifty-mile mark. The body is made of sheet steel with moldings. This new model will be supplied with three styles of body: Runabout, rear seat for one, and rear seat for two. Upholstery is of high-grade leather and the best



The power plant, magneto included without extra charge.

quality of curled hair. All cars will come ironed for top.

The price of this new Maxwell model will be \$850 for the standard runabout, \$875 with rear seat for one, and \$900 with rear seat for two.

DRIVING AT NIGHT.

Care, Good Lamps, Good Eyesight and Constant Outlook Imperative.

To drive safely at night needs good lamps and good eyesight. There has lately been some outcry against the ultra-powerful lamps used by some cars on the ground that drivers of other vehicles, when meeting the glare, have been unable to see for a moment or two afterwards, and that they and their animals are dazzled. There is something to be said for this contention, and the motor world is anxiously awaiting the invention of a lamp which, while giving a good light on the road, shall not be unduly dazzling to other oncoming vehicles. But the public often forget that the position of a horse-drawn carriage and that of a mechanical vehicle on the road at night are widely different. To begin with, the average horse keeps instinctively to the crown of the road, and, whether guided by the driver or not, is unlikely to find its way into a ditch under ordinary conditions. This fact is testified to by every one who has driven horses on the roads at night. Motorists have reason also to appreciate the number of drivers asleep in charge of vehicles while their horses amble on confidently and safely so far as their drivers are concerned, in the middle of the road. There is an old saying in most of the country towns that if the farmer falls into a torpor produced by over-indulgence in alcohol, the horse would, as a water-drinking animal, be able to convey its master safely home again. The motor-car, on the other hand, with all its merits, cannot be guaranteed to take home safely anyone who has had his senses and natural alertness dulled by drink. Nor has it the instinct of keeping in the center of the road. It is, therefore, much more necessary on this account, as well as on account of the capabilities of the faster speed of motor-cars, that motorists should be allowed to carry more powerful lights than other vehicles. In many countries ordinary horse-drawn vehicles are not compelled by law to carry any light at all. It is true that after a time the human eye gets accustomed to darkness, but the mar-

vellous stories of driving home on pitch-black nights related by countrymen are not in reality achievements to be placed to the credit of the man, but rather to the credit of the horse. Nor are there any valid arguments against the universal lighting of all vehicles at night. The agricultural and trading classes as a whole have, in fact, resisted for a long time any obligation to carry lights at night. Now, however, when it has become a question of the safety of numerous other users of the road, they are reluctantly acknowledging the necessity of it.

Driving a car at night entails the need for more caution than would perhaps be thought necessary. First of all it should be remarked that it is more essential to keep to the proper side of the road by night than by day. At corners this is especially true, and left-handed corners should be treated most respectfully, and the car slowed down sufficiently to enable the turning to be made on the extreme right-hand side of the road if necessary, for a sleeping farmer round the corner cannot see or be seen so quickly, and is more likely to pull the wrong rein than in the daytime.

Another need for caution which should be always uppermost in the driver's mind is in regard to vehicles which are overtaken. Generally in this case no light is visible. Unless the motorist has very good lights, the back of the wagon will be found very difficult to discern against the brown-gray service of the average gravel road, until close propinquity brings the risk of accident.

On the main roads of the country generally there is but little traffic at night after 9 or 10 o'clock, but on the main roads near the metropolis traffic practically never ceases, for the vegetable and fruit supplies of large cities are brought in by market garden carts which leave their destination in the evening, arriving in the city some time after midnight, while many of them leave again for their return journey some long time before sunrise.

In addition to the danger arising from collision with vehicles seen too late to avoid accident, special care should be taken between the hours of 9 and 11 with regard to pedestrians. Many a man who is able to wander home on his feet is not by any means sober, and his tortuous footsteps along the road are a source of great danger to himself and any other user of the highway. Special care should therefore be exercised when passing through villages and their vicinities about 10 o'clock, and in larger towns about 11 o'clock, these being the times when the latest and thirstiest toppers start for home. Occasionally, too, a drunken man may be seen lying prone on the road. In this case the motorist may, if the road is wide enough, avoid the almost inanimate body; but if the road be narrow and his lamps not good, nothing but strenuous application of the brakes, or perhaps even a voluntary deviation into the ditch or hedge, will save a human life.

Driving during the hours of, say, midnight to 6 in the morning on roads which are well known as comparatively safe, for there is but little traffic, and acquaintance with the features of the highway and the possession of a good memory and efficient lamps diminish risk; but in the case of unknown roads the tension on the nerves of the driver and his qualities of alertness and presence of mind are brought into the highest play. If this is doubted, let anyone take a drive on an unknown highway, be it along a great trunk road, which in the daytime appears so easy and straight, or along secondary roads. A road seems to alter its very character at night. It is so different from what it appears in the daytime as to startle those who are unaccustomed to night driving.

Motorists driving along any unknown road for the first time should, therefore, be ultra-cautious, for there are all kinds of natural features which are apt to be de-

ceiving. To take a common instance, there suddenly appear what seem to be crossroads with a road leading on to what is presumed to be the straight direction, but as a matter of fact the road plan may happen to be in the shape of a T and the road proceeding straight on is only a narrow farm lane, very like ending in a gate, ditch, or deep mud.

Hogbacked bridges are also a cause of danger; for as the car rises up the short steep incline the lamps leave a valley of darkness on the other side which may contain any obstruction on the road, from a closed toll gate to a straying cow. On quiet nights cattle are apt to be huddled together by the roadside or trees near commons or forests, and when the on-coming vehicle and its lights startle them they nearly always rush across the path of the approaching vehicle.

Local road authorities also are often careless, and at times almost criminally negligent, in not notifying with sufficient prominence when a road is closed for repair, or when drains or a line of pipes are being laid in such a way as to obstruct the free passage of vehicles. By law a light has to be placed at each end of the obstruction, but in many country places this regulation is not obeyed, and this sort of disturbance of the roads should be watched for.

Again the overtaking of a pedestrian, or a cart unprovided with a light visible behind, may be often indicated by the tiny sparks produced by the horse's metal shoes striking loose stones, or a countryman's iron shod heels operating in the same way. New unrolled metal may also be dangerous, in that, while it may be seen by day time and the car slowed down for it, at night the sudden impact of two pneumatic tires on to sharp broken stones or on to unrolled and loose granite may result in disaster due to the steering wheels taking charge, or at the least damage to the tires.

There is some diversity of opinion as to whether glass screens are a serious disadvantage when driving by night. The writer has not encountered any real disadvantage in a long experience from this cause, though on misty nights or when snow is falling or there is a severe frost the front of the glass is certainly apt to become somewhat cloudy, and lowering it adds distinctly to the power of view.

On the other hand, a screen is undoubtedly better than goggles and goggles, only, for it is possible to look around the edge of the screen and yet remain sheltered from rain, which would obscure goggles, and without them would diminish the power of vision of the naked eye.

As to what lamps should be used, there are nowadays numerous good types, and, though it is not necessary to have an ultra-powerful searchlight, or wise, on the other hand, a couple of good acetylene lights of moderate power are obviously better than one light of excessive power, and, as a rule, the nearer the ground the lights are, the better both from the point of view of anyone likely to be met and from the driver's point of view also. In cities acetylene lamps are quite unnecessary. In Paris they are not allowed.

Care of the Ignition System.

The entire ignition wiring of a car should be carefully examined from time to time for signs of wear in the insulation. At certain places the wires are exposed to continual, if slight, friction, which will ultimately break through the insulation and establish a short circuit. The timely application of a little insulating tape will often save much trouble in this respect.

Do not use a big spanner to a small nut; you are only risking the shearing of the thread.

EASY STARTING.

Why Should Not Purchasers Favor Self Starting Devices?

A properly made and adjusted engine will start easily and quickly. Speaking broadly, the matter of easy and quick starting depends upon three things—carburetion, ignition and compression. So far as carburetion is concerned, it will generally be found that the difficulty can be overcome by flooding the carburettor, though, as a matter of fact, this should not be required unless the engine has stood for a long time and everything is quite cold. There are plenty of carburettors which give excellent running when the engine is once started, though they rarely provide a good mixture for starting, and it is absolutely heavy labor unless compression taps be fitted or some other means provided for introducing gasoline into the cylinders. Then, again, there are great differences in the way in which engines start. It is impossible with many engines to start them quietly. The throttle must be open so wide that directly the engine starts it races madly and with an appalling noise, whereas another and perhaps larger engine will start with the throttle only so far opened that the engine makes no undue commotion, and one does not have to rush blindly from the starting lever to the throttle to stop the din. This noise does not matter in the motor house, but it is most annoying if one have to restart in a street or anywhere near horses.

As to ignition, there is very little to be said except that everything must be in order, and when a good magneto is fitted there is very rarely any need for anxiety about this. In any case, however, the engine itself is a strange variant. Some engines are exceedingly stiff after standing for a night, and it is impossible to do anything with them till the rings have been freed by the injection of gasoline. On the other hand, there are plenty of engines which never gum their rings, and we must confess that we have not altogether satisfied ourselves that any really good explanation of this difference has been offered. At first glance it would be put down to over-lubrication, but when it is considered that both engines may be over-lubricated as grossly, and one may stick, while the other is unaffected, it is evident that some other explanation is required. All sorts have been offered, but none of them have really seemed entirely satisfactory, as they have been more or less opposed to practice or have not been of general application. At the same time, the matter should certainly be investigated, because if one engine will hold its compression, and at the same time never gum its rings, it is obvious that other makers can find out why this is and make their engines equally satisfactory if they care to take the trouble.

The time will come when every car will be supplied with something in this nature and the car without it will be considered as far out of date as is the rear-entrance tonneau. And it is probable that this time will come just so soon as the buying public indicates to the manufacturers that it wants such a device. While not many makers supply them now, few cars are designed so that it would be impossible to apply some form of them.

The Bearings.

After taking up lost motion in a bearing take care in making the final adjustment that the strain of the bolts does not come on the journal, but on the faces of the bearing lines or bushings.

AT LOW COST.

How One Man Uses His Car at Little Expense for Upkeep.

Is an automobile a luxury for the rich only, or can a man of small means afford to own one?

We have always claimed that it is largely a question of common sense and of knowing how, but is it for the man who rides but once or two a week only, they are so much cheaper than a horse and carriage that the latter is not in the same class. Here is the experience of one man who lies in New York City and it is worth reading:

There are two systems of motor car economy. One is "Don't pay your bills." This is a bad system, because some enterprising creditor eventually gets the car. The other system is "Avoid contracting unnecessary bills." Don't leave it to others. See to it yourself. If you want to keep your car economically you must devote a little of your time, a little of your own thought to doing so. You must give it the same careful thought occasionally which you would devote to any instance arising in your own business.

I purchased a Palmer-Singer Thirty in 1908. It was a demonstrating car and had been driven a good many thousand miles without the engine having been taken down or even the carbon wiped off the spark plugs. There was no opportunity to have it overhauled at that time and besides the weather was too nice.

The car was a little larger than the average "Thirty," and although equipped with runabout body, occupied as much space as a five-passenger touring car. My first problem was to find a garage to make a price concession. I believe there are 9,000 garages in New York City. When I began to look for them, I found them on every block. In spite of the thousands of cars which roam up and down our streets at will, I found that two-thirds of the garages were by no means full. I found that a dozen garages were just starting business, and furthermore that nine of them were not very far from my place of residence. Although the season was open, the weather ideal and I had just got the car, I put it on dead storage at \$5 a month in a garage not far from Broadway and Sixty-sixth street. I have seen better garages, but the fact that this meant only \$5 a month appealed to me. I made a bargain that I could take the car out whenever I pleased, and that on the payment of \$1 per time I could have it washed and polished. That storage keeper was getting a far higher price from the thirty or more other cars in his place. I believe his price averaged \$25 a month. Even that was a big reduction from the \$45 a month charged by the mammoth Broadway establishments. I had the car washed only twice a month—more is useless extravagance. My car was finished in lead gray, a color which I could earnestly recommend to all prospective purchasers. It can stand more pounding, more grinding from sand than one would believe, and leave the car still looking well. Even mud does not detract nearly so much from its appearance as if the car were finished in red or blue.

Here, then, was an item of \$7 a month already. My gasoline, I am free to admit, was far from being a bargain, I might have saved some money by purchasing in large quantities, but the thought that I might wish to change my garage on a moment's notice made unpleasant the idea of lugging around my gasoline

tank hither and yon, so I paid the market price for gasoline.

I have been pretty thoroughly into the subject of cylinder oils and allowed myself the luxury of purchasing about the highest priced oil on the market, because I knew it was good for the car, and results proved the wisdom of my choice. I had the purchasing department of a friendly factory buy me a cask of Havoline, expecting to get a big discount. In this I was much disappointed, getting so small a concession as to be not worth the trouble. I believe there are other oil companies where this procedure would make a decided saving. It had the effect of making me carefully scrutinize the amount of oil used, and to place it in the car myself, using a graduated measure. Oil costs me roughly 25 cents a trip, as I paid \$1 a gallon for it and used for the car about a quart each time we sallied out. Gas at 22 cents a gallon costs me about 80 cents for every trip. By a trip I mean a ride of fifty miles or so, of which I made about three a week; one long night ride on Wednesday or Thursday, a stolen Saturday afternoon a week, good for fifty miles easily, and a dissipated revel of 300 miles on Sunday. In addition to this there were constant evening rides in the park and about Riverside Drive, on which I took no account of the gasoline or oil consumed, as the distance was not enough to perceptibly increase the cost of either. Here, then, my odometer showed a weekly increase of 400 miles, at a total cost for that week of between \$5 and \$6 for gasoline and about \$2.50 for washing and polishing the car and the week's share of the monthly \$5 garage bill. Seven dollars and fifty cents a week was roughly, the cost of upkeep throughout the summer.

Repairs and replacements there were none, except for tires. I had accumulated two extra shoes, paying \$7 for one and \$3.50 for the other. I simply let it be known around the garage that I would buy extra shoes in fairly good condition. The \$7 shoe was a second-hand Michelin, which had been run 1,500 miles and patched in two places. That shoe is on the car to-day, giving perfect service and carrying the same air which I pumped into it last Fall, and although it has been running more than 2,000 miles since then, shows no signs of wearing out, even in the patched places. The other shoe has given fairly good service. I purchased two red Michelin inner-tubes second-hand for \$7, and am using them to this day. Although I drove this car pretty steadily all summer, making some heart-breaking trips with it over rough roads in almost record time. I punctured only three tires, or rather cut them quite badly in each instance, from glass or some other sharp substance on the road. These repairs were made for me by a chauffeur in the garage, who drove a big imported limousine, and he charged me about one-eighth the price which would have been my portion had I taken it to a repair shop. The repairs made by this chauffeur came to a total of \$3.25, and in this connection it is worth while instancing the full tire repair bill for the year, including some professional work done by an automobile tire repair works. The work was most satisfactory and lasted admirably well. I shopped around several places before finding one which I considered reasonable, and the result was the following bill:

4 tubes, 7 repairs	\$3.50
Repairing one Diamond shoe	6.00
2 tubes repaired and patched	1.50
Total	\$11.00

The shoe which I had repaired was one which had been on the left front wheel of the car and was apparently cut to pieces by tire chains. Retreading made it to all appearances as good as new, and it is still in use. This total of \$11 for tire repairs is slight, when it doubtless saved \$150 for new 34x4 shoes. I believe that any owner can have as good fortune with tires if he keeps them heavily inflated, pumping them up, not by guess, but using a pressure gauge such as will be furnished him at a trifling cost by the concern who manufactured the tires he is using. They will also give him a formula to follow which will enable him to use exactly the right pressure.

Upon my family returning from the country in the Autumn it became necessary to engage a chauffeur. At that time, too, the garage where I had been keeping my car, which was on dead storage, failed, and my car was unceremoniously pulled out into the street. I rescued it, however, within the next half hour and placed it in another garage on the same street, which made a similar bargain with me, charging me, however, \$10 a month.

Now as to repairs and replacements. To be brief, there were none. When I first got my car I determined to familiarize myself with it from a mechanical standpoint. Lifting up the hood I found it was full of machinery, I closed the hood. I eventually became able to put oil, gasoline, and water in the proper places and to know when these supplies were necessary. I learned to crank the car readily enough and soon became an expert driver. I never made an adjustment of any kind, and the car has never needed one to this day. The foot brake became loose and I used the emergency brake for two weeks or more until I had an opportunity to take the car in to the manufacturer, who remedied the loose brake band without charge. It has never given trouble since that time. The only cost which I have ever had approaching mechanical expense was to replace the little tube which leads from the Prestolite tank to the gas lamp. This, of course, was an accessory and not part of the car itself. Still, however, this cost amounted to only 75 cents, so I had no reason to complain.

This car was fast enough to run away from many cars of 50 horsepower and over. It developed a world of power on the hills, and, being equipped with a short wheel base, made an ideal runabout for city use. My wife learned to drive it fairly well, although not permitted to do so unless I or some competent driver was along. In spite of her handling, my handling and the handling of others, the car refused to develop trouble. In spite of the fact that it had been used as a demonstrator many months before I acquired it, it suffered nine months of heavy use which I gave it without requiring to be overhauled, to have its valves ground or to have the cylinders cleaned of possible carbon accumulations. It is just an example of the modern motor car. I believe that any owner can do as well with any really first-class car. Cars nowadays are made so that they do not go wrong or give trouble. The owner can rely, if he purchases a standard make, on running as quietly along for month after month without even having to lift up the hood on the road, provided he looks after oil, gasoline and water each time before he makes his start from the garage. My total cost for the year for everything, including tires, repairs on shoes, inner tubes, garage charges, gasoline and cylinder oil, washing the car, etc., was \$300. I paid chauffeurs \$119, making a total of \$419. The catalogue price of this car is \$2,500.

In spite of the fact that it had been in use for

months as a demonstrator before I acquired it and has had more use than most cars get in three years, it has not depreciated in running qualities and at present has a market price of \$2,000. It is strong and durable, and I expect to use it for fully four years more, as high grade cars are now so thoroughly standardized that there will be few construction changes in that time, and even five years from this date it will be far from being obsolete.

HIGH WHEELS.

Some of the Advantages and Disadvantages of Those of Large Diameter.

Notwithstanding the great progress and improvement in the construction of automobiles two great defects still remain—their dust-raising propensities and the bumping of the back of the car on rough roads.

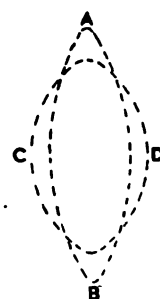
The one makes martyrs of pedestrians and the other of elderly or sensitive riders. These defects could be appreciably diminished by reverting to the old design of high rear wheels. The advantages of high rear wheels are—

- (1.) Appearance.
- (2.) Smoothness of running.
- (3.) Decreased dust throwing.
- (4.) Longevity of tires.
- (5.) Diminished tendency to skid.

Their drawbacks are—

- (1.) Increased weight, necessitated by the increased size and strength.
- (2.) Unsuitability to the cardan drive.
- (3.) Elevation of chassis.
- (4.) Door difficulty.
- (5.) Two sizes of tires.

The superiority in smoothness of running of high rear wheels scarcely admit of question, and need not



Showing the areas of contact.

be discussed. The decrease in dust raising consequent on their use is due to two factors. (1) The chassis can be built higher from the ground; or, if this be objected to, there still remains (2) the most important factor, a narrower tire can be used on a high than on a low wheel for the same result. Inasmuch as the larger a wheel the flatter its curve, the portion of tire at any time touching the ground is longer with a high than with a low wheel. If, therefore, the area of contact with the ground be the same, as is necessary, the longer the contact the narrower it need be to carry the same load with the same pressure in the tire. Thus the areas AB and CD in the illustration would roughly represent the areas of contact with the ground for the tires on a large and small wheel respectively, when equally inflated and loaded.

Obviously the wider area CD traced by the smaller wheel would disturb more dust as the wheel progresses than the narrower area AB traced by the higher wheel. This is true in practice as in theory, as

anyone who possess both sorts of wheeled cars can easily see.

In regard to longevity of tires, the advantage is with that of the high wheel for two reasons. (1) Any part of the tire on a high wheel touches the ground less frequently for the same pace of the car than if the wheel were smaller; and (2) the narrower tire necessary for a high wheel, as explained above, is by the very fact of its narrowness a stronger one. In practice, this advantage tending to longevity is not directly made use of. The tire instead is made lighter and cheaper than would be possible for a wider one of the same resistance, and the gain is taken out in cost.

The higher wheel, admitting as it does a narrower tire to bear the same load under like conditions to those obtaining when the wheel is smaller and the tire wider, introduces the advantage which a narrow tire has as regards skidding.

To high wheels there are obviously many drawbacks, otherwise they would not have been pushed aside in the struggle for the "survival of the fittest." Several, however, of the causes which have militated against the use of high driving wheels are less potent to-day than in the past. There was the side-door difficulty but at present in most of them there is ample room for larger wheels without interfering with the opening of the side doors. The chassis or back axle can also now be bent or arranged in so many ways that the height of the car is easily rendered independent of the height of the rear axle.

The fundamental objections to high wheels, therefore, resolve themselves into three—their greater weight, their comparative unsuitability in the rear to the cardan drive, and the trouble of having two sizes of tires to deal with.

If the car, therefore, be chain driven, and a little extra weight in the driving wheels be not objected to, the only remaining drawback is that the size of front and back tires is dissimilar.

Considering the very little trouble one need have nowadays with tires the drawback of unequal tires does not balance at all the advantages secured by the smooth running of high rear wheels.

Tires and Weight Limit.

There is a certain weight a tire will stand, and is known as the "limit." Where an automobilist loads his car beyond this point he abuses his tires, and sooner or later he will be made to realize the abuse in a monetary manner. If you had an engine and the safety mark on the gauge was set at 200 pounds, you would not be likely to keep the steam to 250 pounds. It does not seem logical, and if the autoist has any real good sense he will not run his car beyond the "limit weight." A size larger tire lasts from two to three times as long and gives better service while in use. Quite frequently the condition arises where the owner is compelled by circumstances to take out a party larger than the maker intended. In such a case the larger size tire will come in quite handy. When the dealer sells you a set of tires he will give you what he calls "recommend" weight, by which is meant the weight at which the tires will produce the best results. An owner or driver should try to bear in mind to stick to the weight as near as possible. It stands to reason if the dealer makes the weight limit five passengers and you have tires of the size that will carry six or seven persons, you will receive better results than if the case was vice versa."

Always make sure your rims and tires are suited to each other.

SO-CALLED "JOY" RIDES.

Occasionally Car Owners Do Not Object to a Chauffeur Using His Car.

Joy rides have gotten more people into trouble than is usually supposed. Chauffeurs and automobile owners have had more disputes concerning joy rides than about all other matters of automobiling. The average chauffeur assumes that he has certain rights with the car for which he is responsible. Too often he feels that he owns it. The machine may have been selected by him. Perhaps he has kept the mechanism in order by hard work and care. He has driven it day after day and often at night. He has become a part of the machine. He may be in love with it. He takes pride in its appearance. He sees to it that the machinery is in good running order. He watches the tires. He keeps them properly inflated. He observes that the seats are clean, the cushions in good order, the lights in perfect operation, the engine working to good advantage and devotes time and energy which he thinks ought to make him at least a part owner in the car.

But the owner of the automobile often looks at it from a different point of view. He may consider that his chauffeur is a part of the machine. But he considers him as merely a mechanical part, which can be replaced at any time, and useful only so long as satisfaction is given. Of course there are reasonable and unreasonable owners; some of whom dote on their chauffeurs and some of whom regard him only a part of the game of touring.

I have talked with livery men and in some cases they have told me that they often give a good man freedom with horses, for the reason that if the employee can use a horse occasionally, he takes an interest in it, and sees to it that it is well cared for. I also met manufacturers of automobiles, proprietors of garages, dealers and owners who told me that they had no objections to letting trusted employees use an idle car occasionally for the same reason. Then again I spoke with renters of machines and individual owners who told me that they had established rules prohibiting an employee from using a car for personal purposes. Others said that they were willing to let their machines go out at stated intervals, with an experienced employee, with special permission.

I found men of wealth who were extremely careless. One man was waiting in his office for his car, and when the car arrived, thirty minutes late, the chauffeur said that the tires were out of order and that he had been delayed. I knew the man, and when I met him later, he told me that he had used the car for a short joy ride, having picked up his girl en route. I spoke with a man in a repair shop, whose automobile I recognized, and asked the man about his trip. He said that he had a break-down while taking the boss to the races. The bill for the repair work was \$4, and was charged to the boss. I happened to be going to the races too. When I got there I saw my man from the shop with two girls on a joy ride. The man had broken down at the track, left his girls, got the repairs done at the expense of the boss and returned for the girls.

While the average chauffeur is honest, there are some men in the profession whom we should eliminate. I happened to be in a gasoline agency when a fellow who I know was out on a joy ride with some gay companions, stopped to get the tank filled. This man paid cash for the oil, and entered the amount in

a little book, so as to charge up to expenses. One of the half-drunken members of the party shouted out, "Charge the beer to the old man, too." With a laugh, the chauffeur added the cost of the last round of beer to the gasoline charge and at the end of the month the old man paid the bill, no doubt.

But not all chauffeurs are like this. In fact, the percentage of dishonest or careless chauffeurs is small. Some of the men are extremely honest and careful. In one shop where I was getting work done for myself, I witnessed a chauffeur pay the cost of the repairs made on a break-down, remarking that the damage was due to his own fault and that he was willing to stand the bill. Thus while some men would have arranged for a rake-off on the expense account for the damage, this man used his own money to pay the bill. In another instance, a child had been slightly hurt by a speeding car, and the chauffeur gave his note to the child for his next week's wages. I learned later that the note was honored at maturity.

There are some owners of machines who watch too closely to permit "joy" rides. Excuses of all kinds are manufactured to get the car out for a joy ride for the best girl, and while the excuse often wins out, it sometimes fails. I have known rich men to employ private automobile detectives. Not long since I met an ex-spotter. This man told me that for a time he kept tabs on certain chauffeurs of rich men with a view of catching the chauffeur using the machine for "joy" rides. He then reported several cases, but for some reason the busy rich men paid little heed. One or two remarked that the "Chauffeur always had the machine on time and in good running order, and that was all that was wanted." Evidently this man did not care if the chauffeur took the pretty kitchen maid out for a joy ride on dull afternoons, as that helped keep peace in the kitchen force. Another man, a mill owner, told the self-appointed spotter to mind his own business.

Effect of Band Brakes on Tires.

Although the band brake used on the hubs of car wheels is a practical one, and does not materially affect tires if applied gradually, it will cause very serious damage when the wheels are locked, especially when going at high speeds. When the motion of the wheel suddenly ceases there may be momentum enough in the vehicle to drag a certain point on the tire along the ground for 15 or 20 feet, and if the surface be of concrete, flint-stone, or partly worn macadam, the effect will be the same as though the tire was held up to a large emery wheel.

When it is known that locking the wheels on a trolley car or railway track will result in flattening the steel tire with which the wheels are shod in some instances, so much so that new ones are required, a motorist cannot expect to subject rubber and fabric to practically the same stress without wearing the shoe tread flat in spots, exposing the canvas and greatly weakening the shoe. A clutch which engages harshly has practically the same effect, as in starting the car from a standstill, the motor is often speeded up, the clutch engaged suddenly, and the wheel spins around several times before the speed is reduced to such a point that traction is effective. The continual grinding action can have but one result, that being to grind away the tread of the tire and produce early failure of the shoe. It is to harsh braking and clutch engagement that all undue rear tire wear can be traced, providing that the tires are not overloaded, and are kept properly inflated.

USE OF TIRES.

How to Reduce the Cost of Upkeep By Careful Driving.

A careless or ignorant car driver will wear and tear and destroy more tires in going 10 miles than a careful one will in going three times that distance. There are three prime factors responsible for short tire life. First, excessive speed, especially during the warm months. Second, changes of direction at a high rate of speed; and, third, excessive and unnecessary use of mechanical brakes. Punctures excepted, the life of tires is enormously prolonged by avoiding the above three cardinal enemies of the pneumatic tire.

If these three cardinal principles are insisted upon by owners, the liability of accident will be reduced to a minimum, and all the high costs incident to property and personal damage. Accidents will also be reduced, as well as wear and tear mentally on an owner in connection therewith. In other words, sanity in the use of the motor car is an incalculable money value which no owner should ignore, and the reverse of the proposition is an unnecessary extravagance, which, if indulged in, should not carry with it an invective against the tire manufacturer or the manufacturer of the motor car. In other words, the responsibility for high costs in running expenses is absolutely in the hands of the owner, or perhaps more directly in the hands of the driver. Excessive speed under all conditions is done at high cost, which can only be reduced by the adoption of sane methods.

Care of the Car Surface.

When an automobile has lost the first gloss of its outer coating it has not only suffered in appearance, but has depreciated somewhat in value as well. Of course, in time, any automobile will need new painting, but this should be a matter of years instead of months, as is too often the case.

The use of needlessly strong alkali soap in cleaning automobiles, neglect to wash off the soap and failure to dry the varnished surface perfectly, are probably responsible for more damage to paint than all other causes combined.

As a matter of fact, neither soap nor water should ever be used on a motor car above the under sides of the fender, except in cases where the mud is caked on the body in large quantities—but with high grade machines, this is virtually impossible. In most cars the first signs of wear invariably show on the varnished surface of the hood. This is due to the fact that the hood is frequently covered with mud on the return from a run and is then washed with soapy water while the metal is still hot. Soap should not be used on the hood until it has cooled, and, even then, should be carefully washed off. After a number of washings, while the hood is still hot, the injurious effect is quite noticeable and within a short time the car is sent to the shop to be repainted long before its legitimate time.

The Brake Linings.

Many a car owner who has complained that the brake linings of his car wear out quickly could prolong the usefulness of these linings by flushing out the brakes when he comes home from a run through mud. It is impossible to keep grit from accumulating between the braking surfaces, and a little water used now and then will do much toward giving you good brakes all the year round.

Automobile Dealer and Repairer

A Magazine of condensed and compact information for busy readers.

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ADVERTISING RATES MADE KNOWN ON APPLICATION

NEW YORK, JULY, 1909.

Missing Numbers—Our readers are requested to remember that it always gives us pleasure to re-send numbers which have gone astray in the mails.

The Automobile Dealer and Repairer in Australia and New Zealand.

Mr. R. Hill, Matlock House, Devonport, Auckland, New Zealand, is our accredited representative in Australia and New Zealand for obtaining new subscriptions.

GO SLOW.

Do you automobilists who are uneasy unless you are going through the country as if you were being shot out of a gun ever stop to think what you are losing?

By contrast have you ever cut down to low gear, passing along some winding highway through which you have never before traveled—each turn in the road revealing some new vista ahead, a broad landscape, a sheet of water down between the hills, a winding stream, a wooded hill at the left and a fertile valley at the right? Or mayhap the road may be so lined with thickets of trees and shrubbery that there is no outlook; but when you pass along slowly and silently the birds and the squirrels have time to give you a curious or a welcoming look while the branches nod in courteous recognition.

Then you may relax your nerves and muscles a bit; you may observe and admire and reflect and enjoy. Then the pedestrian and the driver of the horse-drawn vehicle, and the farmer over in the field, are favorably rather than fearfully or resentfully impressed, and others as well as yourselves have no fear of your participation in highway troubles.

We yield to no one a full estimate—we had almost said a full appreciation—of the speed mania; its pervasive allurements and its masterful temptations. But is automobiling so unattractive and time so heavy that we should try to get as little rather than as much out of them as possible?

It is believed and hoped that the speed mania is but a transitory spasm, and that it will be followed by sane and rational driving whereby as much rather than as little enjoyment will soon be derived from the most delightful and wonderful means of travel thus far vouchsafed to man.

KEEP THE ROADS SAFE.

The general public must not imagine that they alone are interested in keeping the highways and streets safe. Car owners and drivers are just as much concerned in

this as anyone else. They are quite as liable to suffer from recklessness and ignorance as pedestrians and drivers of horse-drawn vehicles. It is not conducive to the enjoyment of automobile riding to feel that the next car you meet may not give you the half of the highway or the portion of the street that is your due. Nor is this apprehension very much mitigated by the thought that the reckless and ignorant may not be more than one driver in one hundred. The next car to be met is likely to be that reckless individual, and with this thought in mind the more apprehensive drivers will naturally be inclined to give the approaching car nearly the whole of the roadway, even though such consideration is unnecessary.

Moreover, car owners have done far more to make automobile driving safe than other users of the highway. In Wilmington, Del., there is an automobile association that has as its chief object the assistance of the proper authorities in enforcing the law. Its members have banded together, not only for the promotion of automobiling, but for the general good of the public, and it is their purpose to see that all interests are guarded in everything in which automobiling is a factor.

If the highways are to remain unsafe, the automobilists themselves will be the greatest sufferers. The pedestrian can, upon a pinch, walk into a ditch. The slow moving horse-drawn vehicle may escape being demolished if the driver keeps constant lookout, and he can do this very much more easily when driving a horse than when his hands are constantly on the steering wheel of a car that is moving at the rate of 20 or 30 miles an hour.

As an eventuality there may be highways specially for automobiles, but even with such a situation it will be necessary that some rules be made for safety. Under present conditions it behooves every automobile driver and owner to do what he can personally to keep the highways safe for all who have occasion to use them.

HIGH AND LOW WHEELS.

Cars of the high wheel, so-called buggy pattern, seem to be growing in popularity, especially in the West, although far less are still made and sold than in the case of the regular pattern. But the reason for this is plain. Thus far it has not been possible to get the speed out of such cars or to secure the ease of riding that are the characteristics of the regular type—speed and comfort being the desiderata of most buyers. But with pneumatic tires the high wheels would be by all odds the easier for both the occupant and for the driving mechanism of the car. With perfectly level road or street surfaces it does not matter so much whether the wheels are large or small so far as jolting is concerned, but in case of raised or depressed obstructions, the large wheel causes far less jolt.

Then there is still another consideration in relation to low or high wheels. The larger the wheel the fewer revolutions a mile at a given speed. Not, as a contemporary says, that "as we increase the diameter of the wheel the circumference moves slower in direct ratio with the increase"; in going a given speed the circumference of the high wheel, or that part that comes in contact with the road, moves neither faster nor slower than with the same speed by a low wheel. The difference lies in the fact that the large wheel travels farther in making a single revolution than the small one.

Were it not for one fact that the lay mind does not often stop to consider, the advantages of the high wheel over the low one would be so plain and complete that it would be adopted without question in all cases. This difficulty is the increased weight required for the high wheel in order to withstand lateral strain. In turning

corners rapidly there is a tremendous twist sidewise, and with a far shorter leverage the small wheel will stand up where the large one will crush over like an egg shell.

So it will be seen that there are several things to consider in fixing the wheel best adapted to all purposes and speeds.

A WHITE GASOLINE CAR.

The fact that the White Steamer Company is about to put a gasoline car on the market is a pretty strong argument that the supremacy of the gasoline car will be maintained and that it is more useful for general purposes than the steam car. The argument is strengthened by the fact that the White steamer is the most popular and widely used steam car, although this need cast no reflection upon the others.

If, as has been claimed, the reason for the limited use of steam cars is because the steam car manufacturers are unable to fill orders, or as has been claimed, "are able to sell all they can make," why enter the gasoline car field and set efforts at variance, or at all events, divide them?

That neither steam nor gasoline cars possess all the merits, or such a preponderance of them that the question of supremacy for all purposes can be settled off hand, goes without saying. Claims to the contrary are weakened by facts that admit of no dispute. The fact is, each method of propulsion has its distinct advantages, but as long as the gasoline car is by far the most generally used it must be assumed that it is on the whole the better for general use.

The 1910 gasoline model of the White Company will be made in two 20 horse power types, differing in details of running gear and body construction, but with identical power plants. It is fitted with a four-cylinder four-cycle engine of simple and neat design. The car has a four-speed selective type transmission with the direct drive on the third gear. The four cylinders are cast in one piece. The cylinder dimensions are $3\frac{3}{4}$ -inch bore and $5\frac{1}{8}$ -inch stroke. The stroke is longer in proportion to the bore than in any other American car, the White construction being in accordance with the 1910 practice of foreign designers. The advantages claimed for the longer stroke are increased power, greater efficiency, and higher economy.

Whatever may be the outcome of this new departure—and we wish this enterprising firm the utmost success—their agents will find themselves somewhat handicapped in selling by the necessity of dealing in comparatives rather than superlatives.

CARELESS DRIVING.

Let car owners and drivers set themselves resolutely against careless driving. There is need of it. According to a Des Moines, Iowa, paper, "the auto evil makes life a nightmare" in that city, and allowing for prejudice and exaggeration, there must be some cause for public apprehension when such a remark can be made deliberately.

Yet about ten per cent. of car drivers are responsible for about 90 per cent. of the carelessness. And, although most accidents are caused by speeding, they are due to speeding in the wrong place or at the wrong time, and not to speed at the proper place and time.

Aside from this undue speed at the wrong place or time, there are many public advantages of the automobile over the horse-drawn vehicle which can at once be seen. It leaves no filth in the streets, and is the most sanitary vehicle that can be found on the streets or roads, while if driven at moderate speed it creates less wear on them than any other carriage.

In fact, there is but one thing that can possibly make the automobile unpopular with the public, and that is the manner of driving. This being the case, a little concerted effort on the part of well disposed car owners and drivers would make it popular rather than disliked. Even those who have no regard for their own safety will find that in the long run it will pay to have regard for the safety of others.

CAR WANTED.

What is now needed more than anything else is a small, compact, easily managed and low priced car for men of moderate means. It should sell for as little as \$500, and be of the best and most enduring material and workmanship.

The firm that will produce a car of this sort can sell more of them than have ever been or will be sold of all the high priced cars in existence. They will go to men who have never felt able to own and keep a horse and carriage for pleasure driving, but who spend considerable in the hire of livery teams, or who perhaps already keep a horse and carriage yet can hardly afford to do so on account of the cost of upkeep and care when not frequently used.

Their hill-climbing capacity should be equal to that of the present large and high-powered cars, and they should be speedy, but not so fast that they will be the terror of other highway users. They are beginning to build such cars over in Europe, although the demand for them there will not be a tithe of what it is in this country, where the middle class is by long odds the principal class.

NOT IDENTIFIED.

Growing Tendency to Escape the Consequences of Criminal Carelessness.

The tendency is growing among unscrupulous car drivers to get away without identification and thus escape the consequence of their carelessness in case of accident. Not only this, but some of these owners or drivers have resorted to a new method of trying to baffle the officers of the law or the victims of their crime. It is known that in some instances the license number required by law has been purposely smeared with oil, the result being that the figures were covered with an accumulation of dust which either obliterated the number entirely or prevented reading it at a little distance. Of course, in case the number of a machine is known it is an easy matter to ascertain who the owner is, but otherwise it is often impossible to trace the ownership of a car when there are so many that look alike.

Without intending to go over the entire ground in order to secure as many cases as possible, the following specific instances are reported wherein the car drivers or owners have gone on without having been identified after an accident. In some of these instances the culprits may have been absolutely ignorant of their car hitting anything or person. In others, they might have afterwards been apprehended, although this outcome has not been reported. With a more careful scratching of the ground the list might be increased tenfold.

In Galveston, Texas, a child started across the street and was struck by a large automobile going at the rate of about 20 miles an hour. The driver of the car kept on his way, and at last accounts had not been apprehended, although the police are confident they have the correct license number. The child was not killed although her injuries were severe.

A big touring car containing three men struck a boy in Long Island City, N. Y., and sped on without slacking

up for an instant there being no clue to the car or its occupants. The lad has a compound fracture of his legs and severe bruises but he will probably recover.

A man in Rollinsford, N. H., was run down on the highway while driving slowly about nine o'clock in the evening. The man was unconscious from that hour until four o'clock the following afternoon. The parties responsible for the accident, and who are unknown, drove on as if nothing had happened.

A lad fourteen years old was struck by an automobile in Brooklyn, N. Y., and taken to the hospital where it was found he had sustained a bad fracture of a leg. The occupants of the car put on increased speed and escaped.

President Charles F. Thwing, the well-known educator of Ohio, was struck by a fast running automobile in Cleveland and sustained serious injuries. The automobile did not stop, although, of course, its occupants were aware of the serious nature of the accident.

Careless driving of an automobile and a disregard for others caused a bad mix-up of teams in Reading, Pa., and vehicles were demolished and horses rendered useless. Unfortunately the number of the automobile could not be discovered; otherwise there would be some serious charges about it in the local courts.

In Albany, N. Y., a little girl four years old was playing in front of her home when she was struck and knocked down by an automobile. The party in the car did not stop, and, of course, there is a bare possibility that they were unaware of having run into the little girl, but this is not likely. A policeman was quite confident that he succeeded in securing the number of the car, but at last accounts the party had not been apprehended.

A young man alighted from a street car in Utica, N. Y., just as a large green automobile came along. It struck him and threw him to the pavement, yet it continued up the street without stopping. There were a number of persons in the vicinity at the time, but none was able to ascertain the number of the car. The young man was badly cut and bruised.

A big automobile which had not been identified at last accounts struck a horse on the head in Atlanta, Ga., and the horse will die. In the automobile were seated several men and women, but the car kept going and escaped without identification.

An automobile ran into one of the horses of an engine wagon in Salem, Mass., and although no serious injury was done the driver of the car put on extra speed and whisked away before any one could get his number.

While standing on the street corner at Des Moines, Iowa, a man was struck by an automobile and had to be removed to a hospital seriously injured. The driver did not stop his car, and the police were unable to secure his number.

Near Sacramento, Cal., a young man was thrown from his wagon and had his leg broken and his scalp injured owing to the fright of his horse when an automobile came up from the rear. The car which scared the horse went on ahead with redoubled speed, and no one is able to give the number or tell who owned it.

St. Paul, Minn., a car ran over a small rock in the street in such a way as to cause it to fly through the air and strike a large plate glass window, breaking it and the car was not caught and it sped away without stopping causing a loss of several hundred dollars. The number ping.

A man was walking in the road late at night near Fitchburg, Mass., when, without the slightest warning, a recklessly driven car came upon him with terrific speed. The victim was knocked unconscious and suffered a dis-

located jaw and bruises with possible internal injury. The brutality of the occupants of the car was shown by the fact that they did nothing to assist the unfortunate man, but proceeded on their way and escaped.

In Richmond, Va., a man was dangerously hurt and his carriage smashed into kindling wood by an automobile, the owner of which is still unknown. The victim was thrown a distance of 40 feet and may not recover. The occupants of the car never looked back after the accident occurred. They probably will not be apprehended.

A young man mounted on his bicycle in a street in Duluth, Minn., was struck by a car and narrowly escaped being ground to pieces, in about the same way as his bicycle was demolished. The number of the car which ran the boy down was taken but it is not registered with the police and the culprits escaped.

A girl 18 years old was struck by an automobile in the suburbs of New York City and received a fracture of the base of the skull, having been thrown 20 feet, although she made a frantic effort to get out of the road when she saw the car coming. She is not likely to live. The automobile had more speed put on and the culprits escaped in a cloud of dust.

In upper New York City a lad 14 years old was attempting to cross the street, was knocked down by a car and may not live. The chauffeur did not stop and thus far no clue can be had as to his identity.

LESSONS FOR DRIVERS.

Carelessness and Ignorance Responsible for Most Accidents.

Many readers have expressed their approval of this car accident feature, but even acknowledging that example is the school of mankind, and it sometimes seems as if they will learn in no other, yet the list is so long each month that we can only select an accident here and there, and moreover, there is beginning to be such a depressing and discouraging sameness in the cause that leads to them, that possibly the space they occupy may better be used in some other way.

But they supply a lesson that should sober the brain of every reader and if they serve to make them more discreet and less overpowered with the speed mania their object will be accomplished. It is indeed a pity that the most wonderful and useful vehicle ever invented by man should be handicapped by dangers that are in every case due to his own recklessness.

Struck a Telegraph Pole.—As the result of an accident near Oakland, Cal., three persons are now being treated at the hospital; their car having run into a telegraph pole. A woman was at the steering wheel and the car was going at a high rate of speed. It was claimed that the steering gear gave way, but this is a very common excuse in case of accident, and not always a sound one.

The Result of a Mile a Minute Speed.—Going down a mountain in the Catskills, N. Y., a heavy touring car was driven round a dangerous curve at the rate of nearly 60 miles an hour. Possibly owing to the twisting motion of the car one of the tires burst and the automobile turned completely over. A woman struck against a tree and had her neck broken. Her husband was badly injured, and their two boys received severe bruises.

Turned Turtle at Full Speed.—An automobile carrying three men turned a complete somersault near Independence, Oregon. Its three occupants were

punctured with bruises and broken bones. It appears that one of the men accidentally knocked the cap of the driver over his eyes and blinded him, which caused the machine to swerve. The automobile is only fit for the scrap heap.

Went Over a Draw Bridge.—At Milwaukee, Wis., three men dashed into the river, not knowing that the draw bridge was open. Two of the occupants escaped, but the other was drowned. The car at last accounts was in the bottom of the river.

Result of Hitting a Rope.—In Watertown, Mass., a large party were driving along the highway when they ran into a rope stretched across to prevent people from invading a baseball game. One of the occupants was thrown out and landed on his head. The others escaped rather more luckily, but the accident was a serious one.

Crashed Into a Tree.—During the early morning hours, a large touring car containing three men and two women, besides a so-called "daring" chauffeur, turned a sharp corner in the northern part of New York City and crashed into a tree. The result is a whole lot of fractured bones and bruises, although none of the gay party is in much danger of dying.

Caused by a Bursted Tire.—One man dead and two men and a woman in the hospital at Elizabeth, N. J., is the result of the bursting of the front tire which threw the car into a ditch. The car was going at great speed and skidded on a sharp curve. This quite likely was the reason the tire bursted.

Obscured by Darkness.—About two o'clock in the morning a serious collision occurred at Westchester, Pa., between an automobile and a large wagon. Three of the occupants of the automobile were seriously injured and the automobile and wagon were both wrecked. The team carried no light and could not be seen. The automobile was probably going much too fast for night riding.

The Result of a Rut in the Road.—Near Olean, N. Y., the rear wheel of a car was taken off and it turned turtle owing to a rut in the road. The occupants were pinned beneath the car, and it took sometime to release them. When one of the women was pulled out she was black in the face and unconscious.

Result of Uncertain Dodging.—At Dover, N. J., a car approached three men, one of them turned to one side of the road, another to the other side, while the third dodged back and forth, and the car driver knew not which way he would finally go. The result was that it ran him down and instantly killed him.

Crashed Into a Wall.—A couple on their honeymoon trip were probably thinking more of themselves than anything else while riding near New Bedford, Mass., and the car crashed into a wall. The pair were obliged to walk the rest of their journey, although they themselves escaped serious injury.

Crashed Into a Bridge.—Near Troy, N. Y., a party in an automobile turned out for another car, and the wheels skidded on the wet boards of the bridge and crashed into the girders. Three unconscious young men were picked up and taken to the hospital. It took several hours to extricate the car from the girders into which it was wedged.

Two Cars in Collision.—Two cars came together head on near Los Angeles, Cal., and were pretty thoroughly demolished. They both had their brakes set as they saw each other just before the crash came. One of the cars rolled over several times, and its occupants were more or less injured. Each driver

blames the other for the accident, but according to the best information, they were both going at a high rate of speed.

Car Turned Turtle.—Near Jamestown, N. Y., a party of 6 turned out for a disabled car and ran too close to a high bank. Before it could be stopped it went over and fell a distance of about 16 feet. The car was badly damaged and its occupants escaped with less injury than might have been expected.

Wheel Broke Down.—In Buffalo, N. Y., a car skidded on the wet pavement, and struck an obstruction. Every spoke in one of the rear wheels broke off and let the car drop to the pavement. The front axle was twisted out of shape, and the car was otherwise injured, but its occupants were not hurt.

A Result of Sudden Brake Application.—Near Lake Hopatcong, N. J., a physician sustained a broken leg, and a woman severe scalp wounds while the chauffeur escaped injury by jumping from the car when it suddenly turned over and was wrecked. It had been necessary to apply the brake suddenly, and the speed having been checked too quickly, it skidded and threw the two occupants at least 15 feet when it turned turtle.

Car Plunges Into the River.—Four persons were drowned in an automobile accident near Woodland, Fla., the chauffeur alone escaping. The road was rather narrow and in some way the control of the car was lost and it plunged, head on, into the river. The four occupants did not come to the surface, and the chauffeur is in such a state of collapse that he can give no definite particulars of the sad affair.

Two Miles in a Blazing Car.—A party of three bound on a pleasure jaunt near Philadelphia were much frightened when they found their car was in a blaze. Two baseball teams stopped playing and succeeded in putting the fire out before the car was entirely extinguished. It is supposed that the fire started from a lighted match and that it had been burning several minutes before it was discovered.

A Broken Brake.—In Minneapolis, Minn., an automobile ran into a buggy throwing the occupants out and seriously injuring them, and demolishing the wagon itself. When brought up before a local tribunal, the driver of the car exhibited a part of the brake which he stated had been broken in attempting to stop the machine.

Car Wrecked By a Train.—Near Oak Harbor, Ohio, a car containing a large party ran on the railroad track and stopped directly in front of an on-coming train. The driver attempted to start the car but he found that the engine had stopped. There was nothing for the party to do but jump, and they all did so, excepting one little girl. In trying to drag her out some of the others were struck by the locomotive. Strange to say no one was killed, but the recovery of two or three is doubtful. The automobile was completely wrecked.

Steering Gear Broke.—The steering gear of a car containing three men broke near Brazil, Ind., and the machine turned turtle. The occupants were severely cut about the face and head, and it will be a very long time before they are able to attend to business again.

Car Turned Turtle.—At Portchester, N. Y., a car was being run through the business center of the town when some of the steering gear became unruly, and the car dashed into a gutter where it was pretty well wrecked. The occupants were all rendered unconscious and hurried to a hospital.

THE REPAIR SHOP

IGNITION WIRING.

Many Breakdowns Due to a Penny Wise Pound Foolish Policy.

BY SIDNEY F. WALKER.

The electrical ignition apparatus of a motor car is responsible for a very large proportion of the breakdowns, and the wires employed for connecting the different parts of the apparatus together, or the wires through which the currents have to pass, that are to produce the spark, are also responsible for a fairly large proportion of the electrical faults. It is a very striking thing, but unfortunately a somewhat frequent one, that while several thousand dollars are spent upon a motor car, an extra dollar or so is grudgingly given in one of the most important parts of the apparatus. The whole cost of the ignition outfit is a very small part of the total cost of the motor car, and the wires



Fig. 1—Wire showing thin layer of rubber and braid.

employed represent a small part of the cost of the ignition outfit, and yet in a very large number of cases, the whole working of the car is jeopardized, for the sake of an extra dollar. Cable manufacturers have devoted considerable attention to the subject, and are quite prepared to supply wires, or cables, as they would perhaps be more properly termed, that with reasonable care, will give practical certainty, so far as their working is concerned. In too many cases, a comparatively stiff single wire is used, often itself not too strong, and it is covered with a very thin coating of insulating material, not too good. The result is, that the wire which, when the motor is first started, answers all right, in a very short time has its covering rubbed through, where it passes over some sharp angle, and is even at times itself parted. The result in either case, with the usual arrangement of wiring, in which the body of the car itself forms part of both primary and secondary circuits, is, the stoppage of the spark. If any one of the wires, either of the primary or secondary circuit is broken, it nearly always means the opening of the circuit, and therefore

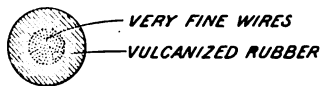


Fig. 2—Showing a large number of fine wires stranded together, the outer cover being good vulcanized rubber.

the stoppage of the current that would furnish the spark. And if the insulation is stripped, and the conductor makes connection with the body of the car, a short circuit is formed, and, while the battery is quickly exhausted, the spark is at least weakened, if not extinguished.

Figs. 1, 2 and 3 show the difference in the section of the wire as it too often is employed, and as it should be. The sections are purposely magnified, in order to show the effect of the difference in the thickness of the insulating envelope. It is quite easy to understand that the thin envelope used in Fig. 1, is

easily chafed through, even by the edge of a board, and very much more so by the edge of some metal part of the car, while it is also easy to understand, that the envelope shown in Fig. 2, takes a very much longer time to wear through than that shown in Fig. 1, and therefore gives a very much better chance of

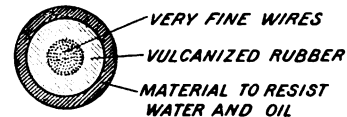


Fig. 3—Fine copper wires encased in good vulcanized rubber with an outside material that stands wet and oil.

continued run. The wire shown in Fig. 1 is a solid drawn wire, No. 18 or No. 16, and it is covered with a very thin coating of rubber, sometimes not even vulcanized, and in many cases not too good. The wire shown in Fig. 2 is made up a number of very small wires, stranded together, so that the whole thing is very flexible indeed, and it is covered to a considerable thickness with well vulcanized rubber. The wire shown in Fig. 3 is also made of a number of small wires, and is therefore very flexible. It is also covered with a good thickness of vulcanized rubber, and it is further protected outside of the rubber, with a

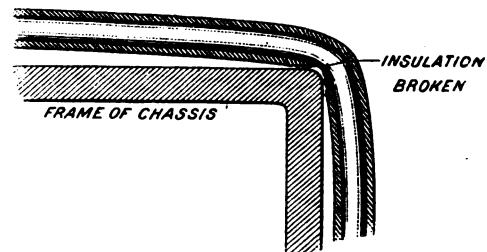


Fig. 4—Intended to show the effect of a solid, thinly covered wire being laid over the edge of some part of the chassis.

thickness of material that withstands the action of oils.

Ordinary pure rubber, such as the cheaper forms of wire are covered with—those used for house bell work, for instance—and which have too often been used for motor car work, will not stand either wet or oil, both of which owners of motor cars hardly need reminding. Vulcanized rubber stands wet very fairly for a certain time. It will stand it well for a long time, if it is made sufficiently thick. It does not stand oil well, though again the provision of a large thickness enables it to withstand the quantity of oil that may get to it in a carefully handled car, for a considerable time. With well vulcanized rubber, protected by material shown in Fig. 3, which withstands wet and oil, the whole thing should stand for a considerable period.

Figs. 4, 5, 6 and 7 illustrate, diagrammatically, the action which goes on when a wire is drawn over the sharp edge of a metal. Incidentally it may be mentioned, that where it can be so arranged, it is worth taking a little trouble, to lay out a course for the wires, where sharp edges, corners, bends of all kinds will be avoided. Where they cannot be avoided, the

flexibility of the wire, produced by the stranding, and by the quality of the rubber and other covering, enables the action of the sharp edge to be minimized, while the thick covering allows for a considerable time to elapse, before it is worn through. Further, good rubber will stand a certain amount of cutting, and will partially heal up, and therefore keep water away from the conductor. The conductor is often severed by two causes. It may be broken simply

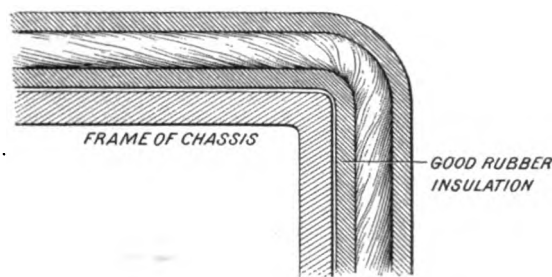


Fig. 5—Thickly covered flexible conductor going over a comparatively sharp corner.

from the vibration of the car, as when the wire itself is stiff, or it may be eaten in two by water penetrating to it, owing to the damaging of the insulation. Rubber will allow water to pass through it, if the rubber is thin, and if it is of bad quality, and if the water is there for sufficient length of time. Again, thickness of good vulcanized rubber, and the outer protection recommended, gives the wire another chance.

Two points more may be mentioned. The quality of rubber is very varied. That grown in the neigh-



Fig. 6—Thinly covered solid wire, showing the effect of chafe.

borhood of the Amazon is worth some four or five times some of that grown in other parts. When the rubber is worked up, and is made into the covering of a wire, there is nothing to show which quality has been employed. Once more the rule is, buy from a good firm, and do not be tempted by cheap stuff. The mere fact that a firm can sell cheaper than the rest of the trade, unless there are very special circumstances enabling them to do so, rules that they must provide bad stuff. The other point is, though the

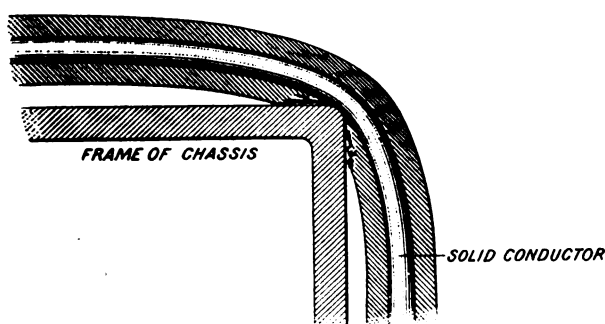


Fig. 7—Showing the insulation of a thinly covered wire at the corner of some part of the chassis.

wires provided are good, the owner of a motor car, and his man, who looks after it, should not rely solely upon its goodness. Every inch of wire on a car should be very carefully examined, at frequent intervals, and whenever damage is seen, that piece of wire should be replaced at the earliest possible opportunity.

THE PAINT SHOP.

Why Midsummer is a Trying Period for Doing Any Kind of Work.

BY M. C. HELLICK.

Midsummer is a trying period for both paints and the painters. The hot, moist days during which the air in the paint shop, despite all possible precautions, quickly becomes foul and fetid are prolific developers of ailments unusual at other seasons.

Paints which ordinarily dry promptly and uniformly, now dry unevenly and with aggravating slowness. Varnishes go wrong under conditions supposed to be favorable to their best development. Indeed, all things appear to work together for the undoing of the painter's most carefully laid plans. The best he can do, therefore, is to practice methods of prevention which are almost invariably preferable to methods of cure.

The coarser pigments used in the painting of the automobile, the primers, leads, rough stuff, and so on, require an extension of time in which to dry. They dry upon the surface, but underneath they are soft and pulpy, in which state, if coated upon, they furnish the volcanic energy that riddles the surface into fractions. All such coats at this time had best be thinned down somewhat below the consistency at which they are generally used, and an extra brushing out upon the surface given. This method fits them to dry quicker than usual.

Nearly all the colors and glaze preparations require an extra time allowance for drying. The humidity affects colors sometimes to a fairly remarkable extent and holds them in a partially dry condition until relief comes through a change in the atmosphere.

Varnish likewise suffers from the effects of heat in which moisture is present, and the two days rubbing varnish becomes under these abnormal weather conditions a four days' rubbing. Extra attention must be given it both in preparing the surface to receive it, and in surfacing it once it is passed upon as dry enough to rub. If rubbed before it is thoroughly hard it sweats out and kills the coat or coats above it, and if rubbed too close it introduces another element of danger likely to blast the lustre of the varnish coat cast above it. The safe practice during these days of mid-summer consists in letting the rubbing coats dry at least forty-eight hours in excess of the prescribed time printed on the label of the can. Then rub thoroughly and stand aside until just before revarnishing when another rubbing, this time a light one, should be given. This will effectually remove all the acrid and acid and poisonous accumulations, along with the sweaty scum smothering the surface. To varnish over such deleterious substances would result in the finishing coat, or any one of the rubbing coats of varnish, sweating out or deadening, sinking in, etc.

It is not possible—and chemists claim it is even undesirable—to dissipate all the moisture present in the varnish room or in the paint shop generally, but in the hot days of summer it is absolutely necessary that a very great per cent. of this moisture be eliminated, to accomplish which put enough heat through the steam pipes, or into the shop stove, to dry the air out. Open up all the available avenues for ventilation, after which, having secured this, close up the shop and introduce the heat as above stated. By these methods the writer has personally taken part in reversing the untoward prevailing hot weather conditions.

To help harden the finishing coat of varnish upon the great bulk of the automobile during the sweltering heat of summer, when after setting just free from dust it stubbornly refuses to dry sufficiently for road service, a

sponge bath of clean cold water will serve to hasten the drying. It both hardens the varnish and sharpens its lustre, two highly important factors when the auto owner is impatiently clamoring for his machine.

Even the grease and dirt and other road accumulations stick harder to the chassis at this time. The help in slicking off these substances after using burlaps strips, scrapers, gasoline or turpentine, or both, take common soft soap in water and beat sharply into a foamy suds, add a bit of sal-soda, or a tablespoonful of washing powder, to a pail of the water and soap, and with soft cloths drench and scour the clogged and sticky parts. When clean rinse off with clean, warm water, and let them dry over night before again taking them in hand.

Priming With Gasoline.

It is a common practice with engines which may be difficult to start to inject a little gasoline into each of the cylinders, as this performs the double office of providing an explosive mixture and also of freeing the piston rings, which may have become somewhat gummed after standing for a few days. A good many engines, however, have no compression taps, so that gasoline cannot be injected this way, but it often happens that these engines have automatic carbureters—that is, carbureters with spring controlled air valves—and it is common practice to pour gasoline into the air valve, as this is close to the engine, and the engine will suck gasoline from here when it will not pull it through the jet. This is all very well, but one precaution should be observed on engines which have the magneto on the same side as the extra air valve. Should any gasoline be spilled when pouring it into the air valve, the magneto, as soon as the spark is obtained, is almost sure to ignite the fumes, so that if there be the least risk of any falling on or near the magneto when priming the air valve it is desirable that a cloth should be thrown over the magneto during the operation to serve as a protection.

A Curious Case of Overheating.

It is a commonplace of the repair shop that ignition troubles often lead to overheating, but few repairers would rapidly diagnose a steaming radiator as caused purely and solely by dirty platina, breaking too widely on the contact breaker of a magneto. Such a case, however, came under our notice, and baffled detection by rather a clever motoring medicine man for several days. A fresh contact breaker from the neat Bosch case of spare parts was finally fitted, though the expedient was rather in the nature of an arrow shot at a venture. Finding that the cooling system immediately began to function perfectly, the discarded contact breaker was carefully scrutinized, and found to exhibit no other defect than a very wide break of the platina, and the fact that they were dirty and did not register squarely. The effects of these flaws were obviously late firing and imperfect combustion, leading to an over liberal supply of gas in the effort to obtain a normal speed of the engine.

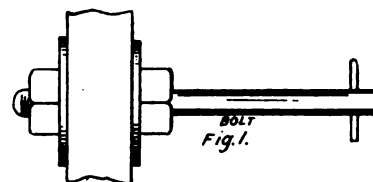
Look Well to Lubrication.

It is so well known that the most important factor in motor preservation is lubrication, that it seems strange more motorists do not take greater care that the correct amount of oil is supplied to the various parts and that all supply pipes and connections are perfectly sound and tight. In motors that are equipped with grease cups it is absolutely necessary to see that they are constantly filled in order to prevent over-heated bearings and excessive wear.

HURRY UP WORK.

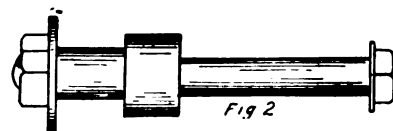
How the Repair Man Is Called Upon To Do Things In a Rush.

The hurry up job is responsible for a great deal of imperfect work in the motor vehicle repair shop. Yet there are times when hurry is necessary. It is very different from the repairing and overhauling of engines and machinery. As a rule, the owner of the motor car is in a hurry for it. It is not often that he owns two machines. He is accustomed to riding to and from his place of business in an automobile. He does not like to fall back on the street cars. Persons are liable to notice and remark concerning his beloved motor vehicle. He is sensitive on the sub-



ject. Hence, when a breakdown occurs, he is liable to rush the car to the nearest shop and urge the boss to get the job fixed at once. So many jobs of the hurry-up nature come to hand in the course of the twenty-four hours that the average automobile mechanic is quite well trained into hurrying. Perhaps the party has a number of ladies waiting in the office while you repair the tire, the engine, the steering gear or other part. You see that certain work is needed in order to make an effective job. But the owner of the machine is at your elbow, hurrying you, and you think of the ladies who are waiting, and you make up your mind to let the main part of the work go until next time, and you perform a hurry-up job and get the party started off. It is so the world over. Consequently the average repairman is fast getting accustomed to performing hurry-up jobs.

Hurry up jobs should be eliminated. But they never will be. Perhaps a man wants his machine for

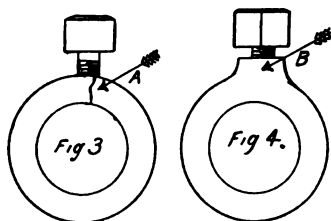


a race that day. A break-down occurs. The trained machinist sees that the only method of making a correct and lasting job consists in tearing out certain worn parts for the purpose of substituting new. This will require time. The machine is needed that day. Therefore the botch system of patching and temporary fixing up is adopted, and the permanent work is put off until some other time. Meanwhile an accident may result.

Botch jobs and hurry up jobs go well together in the motor vehicle repair shop. The latest job of the hurry-up character which I observed consisted in the workman picking up a common bolt as a substitute for one of the lever bolts which had snapped off. The owner of the car demanded the machine in a hurry. He had rented the car and was drumming the district for furnishing goods orders. He had to make a train back that night and cover his district. With this man urging on, the repairman fixed up the broken bolt as in Fig. 1. This bolt had to carry a lever. Fig. 2 shows the correct style of bolt which should have been put in. The machine ran all right for several

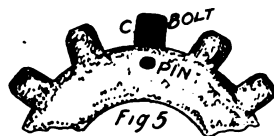
days. The defective bolt was forgotten. When rounding a curve later, the lever bolt bent, making the lever bind, and the car contacted with a wall and considerable damage was done.

In another case a flange ring on one of the steering gear shafts split and fell off. The best that the nearest repairman could find in stock as a substitute was the ring shown in Fig. 3, and made of cast iron. The owner of the car refused to wait until a wrought iron ring could be forged. The set screw was adjusted in the ring, and when set caused the ring to crack at A. The right design of ring for this service is shown in Fig. 4, with its reinforced soulder at B.



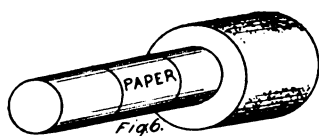
But the man refused to give the repair machinist time enough to do the job right and started off thus handicapped. He had not reached the next town before the cracked ring slipped and another automobile was run into because of inability to steer. The other car was damaged. The car was repaired and the bill sent to the owner of the car which did the damage. The owner of this car forwarded the bill to the shop where the defective ring had been put on. Just how the case was settled we never discovered, but it illustrates that some automobile owners are very inconsiderate.

In another instance a cog got broken from a gear. The repairman insisted upon putting on a new gear, but did not have one with the proper bore on hand.



The owner demanded the car fixed for use that evening and a section of a bolt was plugged and pinned into the space formerly occupied by the cog of the gear as at C Fig. 5. In two days the man was back with the other or meshing gear damaged by the imperfect tooth. Rather than have trouble with a customer, the repairman installed a new set of gears without extra charge. Owners must be humored. Perhaps you can make it up on them on the next job.

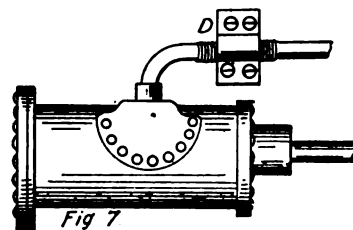
In a certain shop they had to mold a babbitt metal



bearing for a shaft. In his haste the workman cast the bushings the same size as the shaft. The shaft heated the very day the car was used. It was a hurry up job. The automobilist was soon back with the car. Then the boss took hold, worked with more care and time, and cast the bushings with manila paper wrapped about the shaft journal as in Fig. 6. The space taken by the paper allowed for the free movement of the bearing and for lubrication, thereby averting the previous trouble.

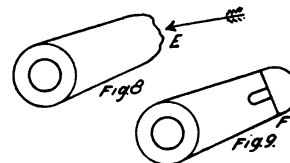
A party stopped at a shop and required that a pipe

be fixed at once. The pipe extended from the cylinder and leaked quite freely. The automobilists had to make time. The repairman seized two box caps with clamping bolts and adjusted them over the leak as in Fig. 7, first winding the place with jute D. It was a



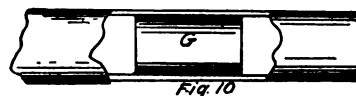
shabby job. However, the car reached its destination and then a new joint of pipe was put in.

Fig. 8 shows a worn cam tip E. A repairman sought to fix a case like this in twenty minutes by boring a half inch hole for inserting a plug elevated to the original height of the cam. The plug caught



and broke off the lifter, and the entire engine was put out of use. Then an oval shaped piece of steel was cut and dovetailed to the levelled top as at F, Fig. 9. This job proved to be strong and workable.

In fixing a pipe in haste, a repairman inserted the



thimble G, Fig. 10, overlooking the fact that this thimble checked the passage just that much. Before an accident occurred, the defect was noticed, and a new joint of pipe installed, although it took a little more time to do it.

In Taking a Car Down.

Whenever it becomes necessary to take apart the car or engine it is always the best kind of discretion to watch the parts very carefully, and where possible mark them to insure proper re-assembling. Take an engine of our cylinders, and many will take out the valves with no particular thought as to which cylinder each one belongs, and on reassembling there is a very probable chance that trouble from leaky valves will result. When we remember that each valve is ground to its own particular seat and that no two are probably exactly alike in these conditions, we can see why it is well to mark each valve and return it to its former seat. Following such a process of reassembling is more apt to result in coming out right in the end and with less need of adjusting to meet the conditions of the re-assembled motor.

Broken Gasoline Pipes.

A piece of rubber tube should always be carried on the car for connecting up the lamp gas tubes. This will come in handily in the case of the fracture of the gasoline pipe, but if this is not to hand, it is better to cut up the pump connection than to have the car towed home.

AUTOMOBILE SPRINGS.

Fractures and the Use of Devices to Arrest Shock and Make Easy Riding.

There are things in connection with the automobile which have not yet reached perfection, among which are the construction and application of the springs. It is not unusual to find 1 and 1½ inch wide steel in springs which should not be less than 2 inches. Again where No. 1 or No. 2 steel or even No. 0 steel would apply better we find No. 3 steel all the way through. Moreover, as the plates grow less in length,

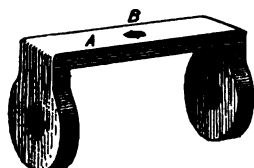


Fig. 1.

they should decrease in thickness, because as the length of the plates decreases, so does their spring action decrease. This in many cases leaves a fracture especially if the spring is put under heavy weight and recedes with a recoil.

Fractures of springs are due to many causes, and they are likely to occur when the wheel drops into a rut or passes over an abrupt obstacle. They are more frequent than in the case of horse drawn vehicles, because the speed of the automobile is far greater. Spring fracture may be reduced by proper appliances and the application of something to arrest the recoil.

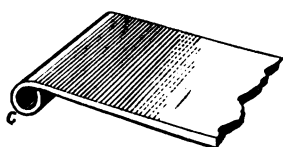


Fig. 2.

Elliptic springs ought never to be applied to automobiles. In carriage building they are never applied to the rear axle when a brake is used.

One cause of fracture is the beading and slotting of the plates, especially when a number of them are placed on the tire at a time and heated. When removed for beading all do not have the same degree of heat and when the bead punch performs its work the fibre of the steel becomes more or less broken, and as a result a fracture occurs. With the slotting process, which is done with a saw or milling tool, much material is removed from the plate, and at the least there is a loss of metal of not less than 10 per cent.

In compression fractures the same breakage usually occurs either at the bend or the slot. Sometimes a



Fig. 3.

breaking loose or a crumbling of a part of the rust between the plates forms a cavity and this invites fracture.

The makers of automobile springs have introduced a feature having for its object the arrest of recoil by the application of a clip buckle shown in Fig. 1. The hole B is for riveting the buckle to the main plate of the spring. These buckles fit the spring very closely, so that the bolts draw in very close to the plate.

These buckles are placed at a greater or less distance from the head of the spring, say from 2 to 4

inches, and so riveted to the main plate to prevent shifting. One condemning feature is the rivet hole in the main plate, another is the close fitting of the buckle which does not allow of any relief, both of which features invite fracture. The buckle shown is not a novelty; it has been in use many years chiefly to prevent the plates from slipping sideways. It is not without value if properly applied. Fig. 2 shows a section of plate nearest to the main plate of which the outer part or end has a scroll or edge C formed for the bolt mentioned in Fig. 1. This dispenses with the rivet and leaves the main plate intact. Fig. 3 shows a rubber cushion which is placed between the buckle and main plate, and this cushion has a recess for the admission of part A on the buckle in Fig. 1. It may be 3-16 or ¼ inch thick. The cushion relieves the plate from violent strain and in every way reduces the possibility of a fracture. A similar buckle placed at the ends of the last plate avoids the necessity of beading or slotting. The half elliptic spring is the only spring that ought to be applied to an auto-

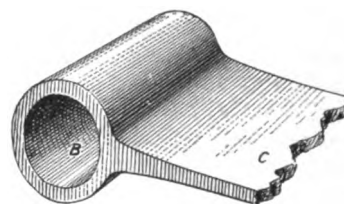


Fig. 4.

mobile in front. For the rear the cross spring becomes a necessity on account of its ease of action. In no instance ought the so-called scroll back end to enter the construction of an automobile. At the best it is frail and easily broken. The rubber head spring is the one nearest to perfection for automobiles. It is illustrated in Figs. 4 and 6.

Fig. 4 shows a front end of the spring, in which B is a hole for the rubber tube and C is the front of the main plate. The head is made of Norway iron and welded to the plate by means of dies, usually with

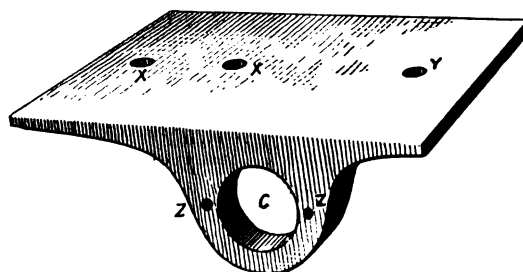


Fig. 5.

a power hammer. If the vehicle weighs 2000 pounds the main plate ought not to be less than 2 inches wide and of No. 1 steel, second plate No. 2 steel, third plate No. 3 steel and 4th and 5th plates No. 4 steel, with No. 5 steel for the sixth plate. The width and thickness of the steel should be increased in accordance with the increased weight of the vehicle. Make the hole B, Fig. 4, for tubing of from 1 inch to 1¾ inches. Make the head bolt from 7-16 inch up to 5/8 inch as required.

Fig 5 shows the jack with the spring head. Two holes X X are in the front and one hole Y on the back. The hole C in the ear of the jack should be ⅛ less in diameter than B, of Fig. 4.

Fig. 6 shows a bolt on the head of which are two small spurs, SS, which center the holes ZZ, in the ear of the jack and prevent turning. B is the part of

the air pipe as near as possible to the over-supplied cylinder. Then, if necessary, enlarge the hole until the correct mixture is obtained for the over-fed cylinder. Next manipulate the vibrators as at first and if necessary enlarge or decrease the size of the hole until uniform cylinder results are obtained from one carbureter adjustment. If by accident too large a hole is made, it may be plugged and another hole made or a very small air cock may be inserted in the pipe at first which can be opened or closed as conditions necessitate.

The result of the foregoing suggestions properly executed will be steadier as well as greater power and considerably reduced gasoline consumption. In my case the mileage per gallon was increased fully one-fifth.

I would like to hear from any one benefited by these suggestions, as I believe there are but few, if any, automobile owners or even gas engine builders who have thought of correcting such a difficulty in such a way.

Gear Shift Levers.

From "Amateur," New Jersey.—It often occurs that you see the chauffeur throwing the levers on the side of his car changing gears and after considerable noise and pushing of the lever the gear is thrown. Such cases are, very often, thought to be caused by chipped teeth of the gears and I was planning to obtain a new set of gears as he had been advised to do by the regular repairmen when the lever used to shift the gears broke from the horizontal shaft entirely.

I removed the horizontal shaft from under the car, which consists of a solid rod operating the emergency brake, and fastened to the brake lever with a taper pin, and the steel tube covering the rod to which is fastened the gear shift lever. I found that the lever had parted from the tube where it had been brazed. To repair this it was necessary to remove the rod from the tube, but to do this took two hours' driving and soaking in kerosene, while the rod was supposed to work freely inside of the tube. After the rod and tube had been separated it was found that dust and dampness had corroded the rod and inside of the tube, clogging the small space so that the rod could not be moved but about two inches in either direction and this with great difficulty. The rod was filed and dressed smooth with emery cloth and, after brazing the gear shift lever on the tube again, the apparatus was replaced on the machine and I found I could throw my gears with my little finger without the slightest trouble. In putting the rod inside of the tube I covered it completely with a mixture of grease and flake graphite and also drilled a one-eighth-inch hole in the top of the tube in order that I might oil it frequently. If an owner finds that when he attempts to throw his gear from high to low speed his emergency brake lever comes back at the same time or in throwing on his brake he pulls his gear out I would advise taking it apart as above and the result will be well worth the time and labor used.

The Steering Gear.

From "Amateur," New Jersey.—Last winter the writer engaged a repairman, who, like too many others, claimed to "know it all," to overhaul his car. The steering gear was taken apart, which I will add was the worm gear type, and after it had been put together I found a small set screw lying on the floor of my garage. I called the attention of the repairman to this and he said he could not see where it came from, but after looking over the machine he decided it was to plug a small hole in the steering gear and screwed it in without further notice. When I took my car out in the spring for my first run I had not gone far when I noticed my steering gear work-

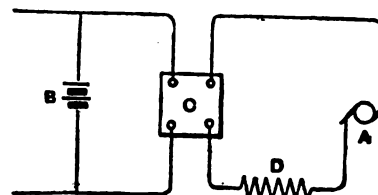
ing very loose, so I immediately turned the car around and went home. The car was entering my garage when the eccentric pin holding the steering gear dropped out on the floor and the steering wheel became useless. I removed the entire steering gear and found this was caused by the small set-screw mentioned above not being screwed up to the eccentric pin to hold it in place, and I also found that the repairman had placed a cotter pin in a hole on the end of the eccentric pin which was of no use whatever as the hole was placed in the pin for adjusting the eccentric pin to take up lost motion in the worm gear.

This was a good experience for me, as I am now fully acquainted with the construction of the steering gear and know how to watch it closely for any slight defect which may occur.

Electric Ignition for Gasoline Motor.

Question.—An accumulator and coil are used for ignition in a stationary gasoline motor used for electric lighting. Can the current generated by the dynamo be used for ignition purposes instead?

Answer.—Since the current generated at a low speed (when the engine is starting up) would be too small it is necessary to retain the accumulator, at any rate, for starting purposes. When once running, the cell could be cut out of use, and current taken to the coil direct from the dynamo, through a suitable resistance. Querist's idea is apparently to do away with



The extra ignition.

an accumulator altogether. This cannot be done entirely, retaining the coil method of ignition; but the cell can be automatically charged during the running of the dynamo by connecting as shown in the accompanying sketch. A represents the dynamo, B the accumulator for ignition, and C an automatic cut-in and cut-out. On starting up, the accumulator supplies current to the coil; when running at correct speed the automatic cut-in C closes contact with the dynamo circuit, and the dynamo then supplies the coil through a suitable resistance D, as well as keeping the accumulator B fully charged. On slowing down, the automatic cut-out opens, and prevents the accumulator discharging through the dynamo armature. To dispense with accumulators altogether, a magneto must be employed, such as the Bosch K-23 type, which actuates the armature by means of trip gear with spring return to the arms, so that the necessary speed on the magneto armature is obtained irrespective of the motor speed at starting up.

If the valve of an inner tube leaks, unscrew it with the stem cap and put a drop of oil on the small rubber washer and replace. Do not worry about the oil spoiling the rubber.

If you want to get rid of storage and dry cell battery troubles get a low tension magneto to use with your present coil.

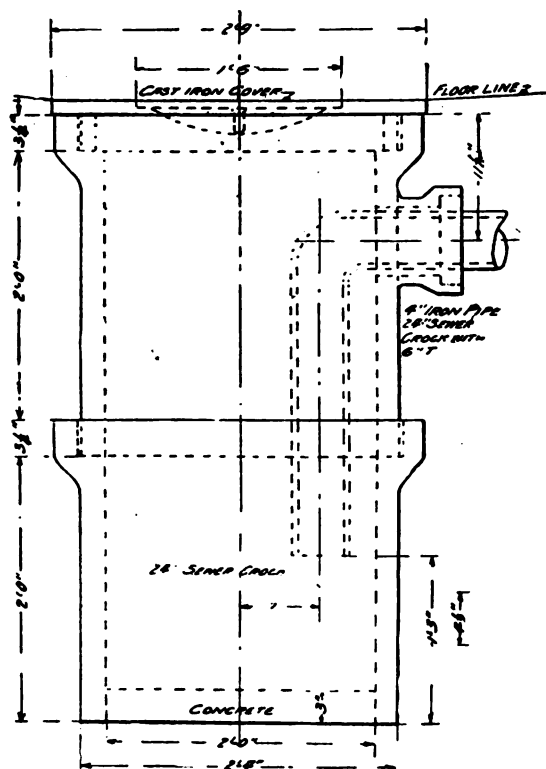
Oil the inside of your timer with nothing but pure castor oil.

A GARAGE CATCH BASIN.

Plans and Specifications For a Cheap and Effective Device.

While it is some little time since the subject of garage drainage and the question of ridding the waste of volatile fluids received its greatest amount of attention, it is safe to say that there are numerous garagemen who are still perplexed over a solution which may be arrived at both simply and cheaply. Hence the following system is noteworthy as presented by Domestic Engineering. The catch basin described and illustrated is recommended by W. G. Williamson, an inspector of plumbing.

In explaining his plan Mr. Williamson states that while he would not under all conditions say that in sanitary work the cheapest construction would be the best, he believes that in this case it is, and that the method he suggests will prove more satisfactory, or



Catch basin plan.

at least fully as satisfactory, as more expensive methods of construction.

As will be seen by reference to the accompanying drawing, made to a scale of one inch to a foot, the method calls for the use of one section of 24-inch sewer crock set on its spigot end in a bed of three inches of concrete to make a perfectly water-tight base. In the hub end of this two-foot length of sewer crock he places a 24-inch sewer crock with a 6-inch tee, the joint being made of concrete. A 4-inch iron pipe elbow is carried through the 6-inch tee opening of the upper section of the crock, the joint to be made with concrete, and the elbow turning down so that its lower end will come within one foot of the bottom of the catch basin, which ought to provide ample space for sand and settleings so that the basin would not require cleaning too frequently. The seal provided for this elbow is nearly two feet, which should be ample to prevent any gasoline getting ever into the sewer.

Whatever gasoline finds its way into this catch

basin will be vaporized and the vapor passes through the perforated cast iron cover of the catch basin into the garage, and thus makes the presence of the gasoline known and causes caution on the part of the attendants. The cover of the catch basin consists of a cast iron cover ring with an annular ring which sets into the hub of the upper section of crock pipe and which, if desired, can be set with concrete, and would probably be best so set, as the ring would remain rigid when wheels passed over it. The removable cast iron cover is perforated with 1-inch holes set in rings 4 inches apart and this cover is made with ribs on the under side to strengthen it. The entire catch basin is set so that the floor will drain to the perforated cover.

Cars for South America.

From Subscriber, New Hampshire.—I am a subscriber of your publication and note with interest in your June issue the article under the heading "Cars Wanted In Mexico."

I believe there is a great and remunerative field for the exploitation of motor vehicles, not only in Mexico, but in the several South American republics. While I am an American by birth, I went to Chile, S. A., when twelve years of age, accompanying my father, who went there to start a woolen mill. I was educated in Valparaiso and speak and write the Spanish language like a native. I have (as you will see by this letter head) followed the woolen manufacturing business; in my youth I was quite successful as a traveling salesman as well. I have just severed my connection with the Cocheco Woolen Mfg. Co., after seven years service as manager. I have no other position in view at this writing.

I have owned and operated various cars, both steam and gasoline during the past seven years, taking care of them myself as I am a pretty good mechanic; at present I am running a four-cylinder Elmore.

If any firm of automobile builders wish to exploit any South American countries (and I firmly believe that a great and profitable field exists there), I would like to be put in communication with them as (in all modesty), it would be difficult to find a man so well qualified as myself to do business in those countries. I suppose at the present time the manufacturers are not concerned about disposing of their product, as they can hardly make deliveries the demand at home is so great; but the time is surely coming when conditions will be different and the pioneers in the Mexican and South American fields will have a distinct advantage over their less perceptive competitors.

Again, I think they can command higher prices in South American countries, thus insuring greater profits. I will greatly appreciate your kindness if you will put me in communication with parties likely to be interested in this matter.

[Note.—The address of the writer of the foregoing may be obtained at this office by anyone interested. The automobile trade of Mexico and South America is bound to be heavy in the near future and the American manufacturer of a good and reliable car, who gets an entering wedge there will find an outlet for the sale of more cars than perhaps all other countries combined in the world.—Editor.]

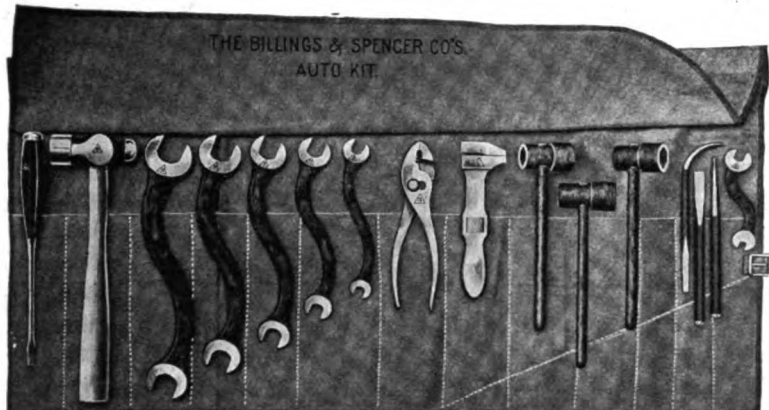
To Remove Carbon.

Here is something highly recommended to remove carbon deposits but we have never tried it: "Put an ounce of baking soda into each cylinder, add one-fourth of a pint of paraffin, then turn the engine over a few times to thoroughly soften the deposit."

THE B. & S. AUTO TOOL KIT.

Every car-owner should carry a good tool-kit on his car. We illustrate an especially meritorious kit, which is manufactured by the Billings & Spencer Co., Hartford, Conn. The name of the maker is in itself enough to vouch for the quality. All are drop forgings, which is evidence

the right kind of Goodyear tires and now has several in operation. In the old way of making tires by hand, they have been built up, first a layer of fabric, then a layer of rubber and another layer of fabric, and so on until the body was complete. This fabric has always had to be stretched on by hand by men skilled in tire making.



The Billings & Spencer Company's Auto Kit.

of the endurance that may be expected, and the kit consists of 16 pieces aside from the canvas roll. The tools are a nine-inch "All-Steel" screw driver, an eight-ounce ball pein hammer, six-inch nickel pliers, model D nickel adjustable wrench, a set of three double-end socket wrenches with openings ranging from three-eighths to seven-eighths, a three-eighth-inch cold chisel, a cotter pin tool, a punch, and a set of six full finish general service S wrenches with openings ranging from quarter-inch to 15-16ths-inch by sixteenths. The company will quote prices on special tool kits which may vary in any way from the standard given above. Write for their catalog and mention this journal.

THE Lovell-McConnell Mfg. Company of Newark, N. J., believe that "whatever is worth doing at all is worth doing just as well as it can be done," and they have not only exemplified this principle in the well-known Klaxon signal horn but they have also practised it in getting out a little booklet illustrating and explaining what this so-called "ex ray of sound" will do and how it is produced, also why there is and can be nothing else like it for the purpose. Our readers who are interested in the science and utility of sound and how it is produced for use on automobiles should send for a copy, addressing the manufacturers, and mention this publication, if they think of it.

TIRE MAKING BY MACHINERY.

The Goodyear Tire & Rubber Company



The old way of stretching the fabric on the core by hand. A physical impossibility to do this work uniformly.

has been working for years to perfect a tire-making machine that would turn out



A view of the Goodyear Tire-Making Machine, showing the operators on each side stretching on the fabric.

over each portion of the tire, and each alternate layer must be given the same tension as those previously put on. It is self-evident that this evenness of tension could not be given when human hands were depended upon, as tires made in the morning



A view of the Goodyear Tire-Making Machine showing how the fabric is rolled down after it is stretched over the core.

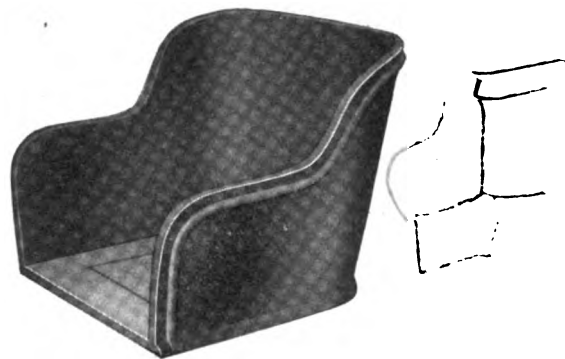
when a man is fresh will be stretched more tightly and evenly than later in the day when his muscles have become weary. The new Goodyear machine gives a positively even tension to every strip of fabric used in every tire. The accompanying illustrations show both the old method of laying fabric by hand and the new way by the Goodyear tire-making machine.

THOSE who are in need of anything in the way of a car seat should write to the Borbein Auto Co., 2109 North 9th St., St. Louis, Mo. This firm makes rear seats to fit on Model T Ford roadsters, also for



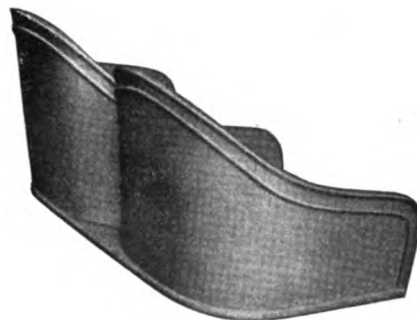
Low Back Seat.

Buick and Maxwell-Briscoe roadsters, and, in fact, seats for about any purpose that may be required for use in an automobile.



High Back Seat.

Their work is said to be unusually well made and their prices are as low as good work can be marketed for. Some of their



Low Back Double Seat.

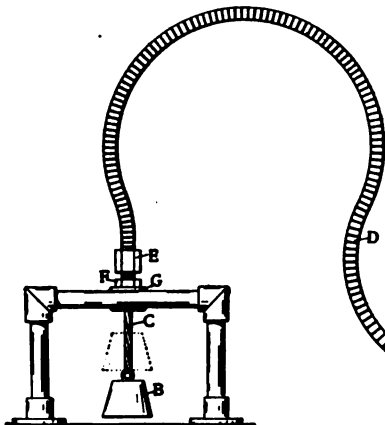
latest designs are high and low backed rumble seats and double individual seats. Mention this journal in writing them for information of any sort.

A GOOD PORTABLE CRANE HOIST.—A good appliance for hoisting is a necessity in every well appointed garage or repair shop. In this connection we wish to call attention to the Hercules Portable Crane Hoist. This is manufactured by William S. Nicholls, Hoosic Falls, N. Y. An illustration of this hoist will be found in our advertising columns. This hoist is used in many of the leading automobile garages and factories throughout the United States. Our readers are urged to send to the manufacturer for a descriptive circular. This hoist is particularly durable, efficient and convenient, and should command a ready sale wherever automobiles are handled or repaired.

Subscribe to the "Automobile Dealer and Repairer," \$1.00 Per Year.

A USEFUL AUTOMOBILE WIRE.

The Bowden wire has just been introduced in this country. Abroad over two million feet are used every year for the transmission of reciprocating motion through a flexible and tortuous route. It has also been adopted in the British, French and German navies. J. S. Bretz, of the J. S. Bretz Company, who import the wire, uses it to operate the Solar eclipse on the gas lamps on his car, which per-



Bowden Wire for Use on Sharp Curves.

mits him to be able to use the full headlight in the open country, and shade the light in the city so as to comply with the local ordinances against glaring headlights.

Briefly, the Bowden wire mechanism consists of two parts, a closely coiled and practically incompressible spiral wire, constituting what is termed "the outer member," and a wire cable, practically inextensible, threaded through the above, and termed "the inner member."

Previous to the introduction of the Bowden Mechanism, the usual mechanical method of transmitting power in other than a straight line was by means of angle levers and rods, cables and pulleys, and other such devices, all of which necessarily involve considerable complication besides increased labor and expense in adapting them satisfactorily to the user's requirements. The Bowden Mechanism dispenses with all these difficulties, while enabling power to be transmitted by the most tortuous route. The Mechanism is complete in itself, and requires only that one member shall be anchored to a stop at each end and that the other member shall be attached to an operating lever at one end, and to the object to be moved at the other.

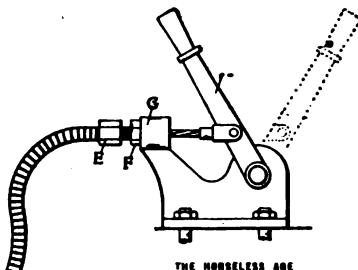
The Bowden wire mechanism is particularly adapted for motor car, motorcycle and motor boat service, and although the opportunities for its use are practically unlimited, and in every case its employment is accompanied by decreased cost of actuating mechanism, simplicity, instantaneous operation of actuated parts, due to absolute lack of lost motion. Its best uses are indicated for brakes, ignition and throttle controls, sprague, muffler cutouts, auxiliary air controls, and carburetor ticklers, all operating from the driver's seat.

If further information is required address J. S. Bretz Company, Times Building, New York.

THE WEILAND SUPPLEMENTARY CARBURETOR.

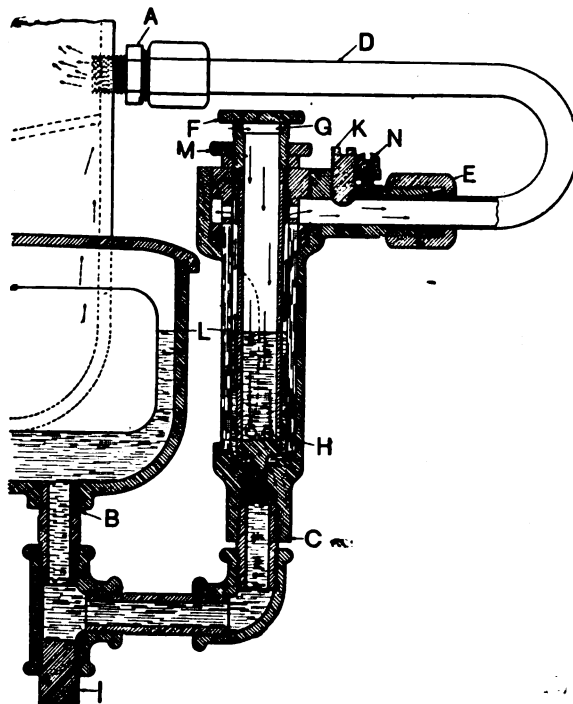
An important new invention is the Weiland Supplementary Carburetor, a sectional view of which is shown herewith. This is a device which can be attached to any float feed carburetor as a permanent fixture and when properly adjusted will require no further adjustment or attention. This device is attached to the side of the float

chamber in such a way that the float level is visible in the gauge glass. The amount of gasoline in the gauge glass is adjusted according to the size of the engine. The Supplementary Carburetor is connected with the bottom of the float chamber, and the gas outlet is connected with the intake pipe at some convenient place between the throttle and the inlet valves. With this device advantage is taken of the high suction between the throttle and the inlet



THE NOBLELESS AGE

line is under the constant head of the gasoline in the float chamber, and as this is always the same the supply of gasoline from the Supplementary Carburetor is the same at all speeds. The flow of air, however, varies with the speed of the engine. At slow speed and at starting a very rich mixture is supplied, and at high speed a very weak mixture. By having the gasoline flow independent of the air velocity the defect of most carburetors is overcome, that is, when starting or when a sudden load is thrown on the engine, the air velocity past the nozzle drops very low and the gasoline stops flowing with the result that the motor stalls. With this device the mixture becomes richer when the engine slows down, with the result that it delivers a good pulling mixture. With the Supplementary Carburetor, you will find that in case of a mechanical carburetor you can give the carburetor more air by opening the air port, and in case of an automatic carburetor you can reduce the tension of the spring on the automatic valve. In both cases the air passage through the carburetor is freer with the result of fuller charges for hill climbing and high speed. It is claimed that this device will increase power, give greater uniformity and add materially to the efficiency of any car, besides effecting a considerable saving in consumption of gasoline. This highly recommended appliance is manufactured by the American Die & Tool Co., of Reading, Pa. Write them for prices and particulars. The price of the device is nominal, and it will be put out on trial for ten days. If, after such trial, the instrument does not give en-




Weiland Supplementary Carburetor—Sectional View.

down and up through the gasoline (in starting), which gives a very rich mixture for starting. When the engine is running all the gasoline is taken from the gauge glass, and only gas is seen above the holes H. The holes H are below the level of the gasoline in the float chamber, and when the engine is running the gasoline is just below these holes. No suction is created on the gasoline in the float chamber, as all the air openings for admitting air to the Supplementary Carburetor are very much larger than the outlet. The flow of gaso-

tire satisfaction, money will be cheerfully refunded and no questions asked. It will pay every car owner and every dealer to investigate. In writing mention this journal.

THE EMPIRE TIRE Co., of Trenton, N. J., announces that it has opened a branch house in Philadelphia, Pa., at 322 No. Broad St. This branch will be in charge of E. B. Richardson, who has in the past represented the company in the capacity of general salesman.




**Saves
1/3
The Cost
of Your Car**

Perfect lubrication—the kind you get from Vacuum MOBILOIL—will run your car a third longer and at a third less expense than if you merely trust to “lubrication,” the common, careless, chance-taking kind.

**VACUUM
MOBILOIL**

is made in six different grades, one of which is made for your particular car. It saves you expense and experiment. It protects your car from friction, the hardest, costliest kind of motor wear.

A valuable booklet on motor lubrication will be sent free on application. Lists every automobile made, and shows grade of MOBILOIL necessary for its perfect lubrication. Contains track records up to date, and facts of vital interest to motorists.



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VACUUM OIL CO., Rochester, N. Y.

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all about the

Diamond

line of Repair Material, Tread Stocks, Tire and Automobile Accessories.

Complete in every detail and Diamond Quality throughout.

New illustrated catalog is yours for the asking.

THE DIAMOND RUBBER CO.,
AKRON, OHIO.

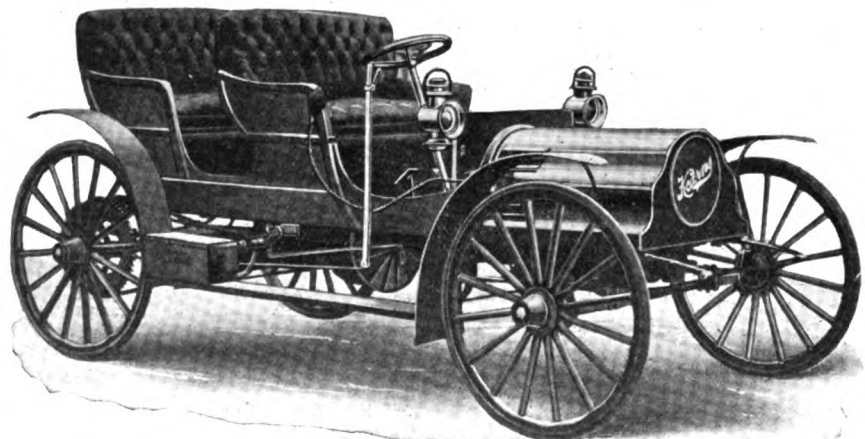
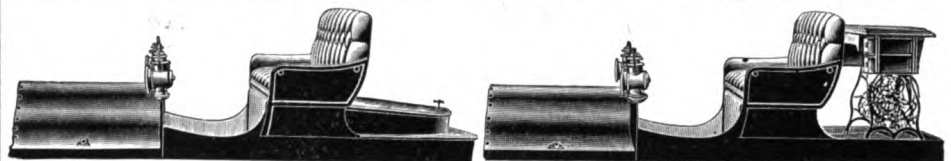
“GOBBO,” THE GOD OF GOOD LUCK.—It is quite a fad among motor car owners to place some sort of a figurehead on their radiators; and in some instances this has taken the form of a little statuette, which is supposed to bring good luck to the car owner. One of the cleverest of these statuettes bears the name of “Gobbo.” It was the original “Gobbo” that brought good luck to the Maxwell car in its recent remarkable 10,000-mile run. The public is warned to beware of inferior imitations. “Gobbo” is sold at such a low price that he is certainly within the reach of every car owner. The three-inch size is offered to our readers at 50 cents and the five-inch size at \$1.00. Send your inquiries and orders to the S. M. Supplies Co., 24 Lincoln Street, Boston, Mass. These prices are quoted with the understanding that the AUTOMOBILE DEALER AND REPAIRER will be mentioned in all inquiries.

A GOOD SPARK PLUG AT ONE-THIRD REGULAR PRICE.—We wish to call the special attention of our readers to the remarkable offer made in their front cover announcement this month by the Standard Sales Co., 1775 Broadway, New York City. They offer to send to any of our readers who will cut out and send in the coupon attached to their advertisement a sample of the celebrated Fry spark plug. This plug is adapted for either magneto or battery ignition. It retails regularly for 75 cents, but the sample will be sent for 25 cents, if you will only take the trouble to fill out and send in the coupon. Be sure to give the make of your car, name of your dealer, and also the size thread on spark plug desired. The Fry plug is scientific in construction, combining simplicity with strength and durability. Send your 25 cents and get one of these plugs and it is more than likely that you will wish to purchase more at the regular price from your dealer.

GEARLESS, VALVELESS, CLUTCHLESS.

With these improvements and a two-cycle, air-cooled engine with friction transmission, the

KEARNS MOTOR BUGGY



has no Gears, Valves or Clutches, which are the three witches—the three old Hags—of motoring, and there is no more

**Boil and Bubble, Double Trouble,
Fire Burn and Cauldron Bubble.**

Send for catalogue and get full particulars and prices. Address the

KEARNS MOTOR BUGGY CO., Beavertown, Pa.

WANT ADVERTISEMENTS.

Under this head will be printed advertisements of shops for sale or to rent, or shops wanted, or situations or help wanted, or tools or machines (second-hand) wanted or to exchange, at the uniform price of two cents a word, which will include the address, for each insertion, payable in advance. No advertisement will be inserted for less than 30 cents, however small.

Remittances can be made in postage stamps if more convenient. Address,
MOTOR VEHICLE PUBLISHING CO.,
24 MURRAY STREET, NEW YORK.

BUY FROM THE ORIGINAL OWNERS—Over 500 private owners have listed their automobiles with us for sale. Among them are many choice bargains. Write us about what you want. The Motor Car Exchange, 605 14th St., N. W., Washington, D. C.

COMMERCIAL MOTOR VEHICLES—Read the "Power Wagon" for reliable information concerning motor trucks, motor buses, motor cars and other machines employed for business purposes. Issued monthly; single copies, 10 cents; \$1 a year. The most valuable paper of its kind published. The Power Wagon, Metropolitan Block, Chicago.

TOPS—Until further notice, runabout tops \$20, touring car tops \$35. C. G. Meyer & Son, Tiffin, Ohio.

NEW and second-hand engines, transmissions, radiators, carbureters, mufflers, steering gears, timers, coils, springs and everything for the assembly. We also rebuild motors, repair cylinders with lost compression, frosted water jackets and radiators. Write for estimates. Address Auto Parts Exchange, 3702 6th Ave., Des Moines, Iowa.

CONCERN manufacturing automobile accessories is open to considering the manufacture of any specialty on royalty or otherwise. Address Box 2153, Boston, Mass.

FOR SALE—1908 Economy Motor Buggy, good as new, top, lamps, horn, complete \$200. 10 hp., two cylinder, air-cooled engine. Address S. A. Clark, Kimbolton, Ohio.

TWENTY h. p. runabout; A1 shape; price 'way down; demonstration. C. L. Jones, Haskell, N. J.

WANTED—Two runabouts and one light touring car. Condition no object. F. S. Lefebvre, Hartford, Conn.

AUTO DRIVERS—A NEW METAL Polish. What you have been looking for. Try a box and be happy. 15 cents by mail. F. W. Barber Mfg. Hart-Lot, Onondaga Co., New York.

ELMORE CAR, TWO-CYCLE MODEL 9, EXCELLENT CONDITION. Full equipment, including pair of Woodworth treads, price, \$300. Wayside Company, Clintonville, Conn.

BELOW COST PRICES ON ENGINES, transmissions, oilers, axles, steering, and auto parts generally. Real bargains in new and second-hand cars. Let us know your needs. John H. Blacker & Company, Chillicothe, Ohio.

FOR SALE CHEAP—Two Motz tires nearly new; one double generator. J. T. Paxton, Glenwood, Ind.

LOOP FRAME INDIAN MOTORCYCLE wanted in trade for 4 h. p. Orient Buckboard. C. L. Bossmeyer, Freeport, Ill.

AUTOMOBILE CYLINDERS WELDED. We weld anything in metals, iron, steel, copper, brass, aluminum and cast iron. We pay the freight. J. C. Wilson Co., Cass and Adams Avenues, Detroit, Mich.

FOR SALE—\$250.00 buys 5 passenger Searchmont A-1 condition, new tires.

\$300.00 Buys single cylinder, four passenger, Cadillac, canopy top, storm curtains, gas light, A-1 condition. Triple-Stat, Electric Company, Charleston, W. Va.

FOR SALE—AUTOMOBILE ENGINES, 4-cylinder, 4-cycle water-cooled, 4 1/2 inch bore and 5 1/2 inch stroke. Also well suited for boats. Entirely new, in original crates. Price, \$235 each for immediate orders, including exhaust and intake manifolds. Evansville Automobile Co., Evansville, Indiana.

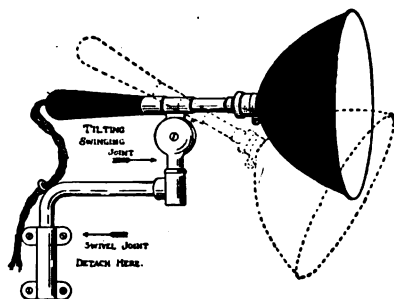
WILL TRADE or sell 15 passenger sight seeing car. E. H. Davis, Ewart, Mich.

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MAPS AND GUIDES FOR AUTOMOBILISTS.
SEND FOR CATALOGUE
C. S. MENDENHALL, PUB.,
39 Opera Pl., Cincinnati, O.

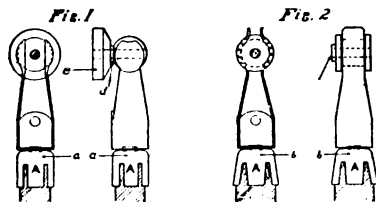
AN IMPORTANT LINE OF ACCESSORIES.

Our readers who may be looking for a line of extremely practical goods should send without fail for an illustrated price list of automobile accessories to Frank W. Morse, 510 Atlantic Avenue, Boston, Mass. Mr. Morse manufactures a full line of



Morse Search Lamp.

popular articles for the trade. These include "Trouble Lamps," which are the most practical ones on the market, as they allow free use of both hands and can be hung up, stood up or laid in any position so that the eyes are shaded and the light is reflected



Morse Spark Plug Connectors.

just where it is wanted. These lamps are invaluable for repair work. They are operated by a dry battery.

He also manufactures a Vapor Proof

Garage Lamp, which prevents the risk of explosion. Readers should refer to the advertisement on our inside front cover page for an illustration and description of this lamp. Mr. Morse is also offering an Inspection Lamp for inspecting cylinders, etc., and Search Lamps for automobile delivery wagons, to be used in sorting bundles and reading names and numbers on doors, thus saving a lot of time and extra work. These search lamps are also especially



Morse Trouble Lamp

adapted for use on motor boats. The light is thrown from 75 to 100 feet, and this lamp can be run with a battery of five dry cells.

Mr. Morse also manufactures connectors for sparking plugs, three styles, which he describes as strong in make, easily adjusted and the most efficient of any on the market—can also be readily detached. Another Morse Specialty is a spring connector for batteries, etc. These connectors have wide opening jaws and strong springs, which give them a great advantage. Mr. Morse

can also supply binding posts, special screws, oil cups, nuts, washers, etc.

He wishes to place his price list in the hands of automobile dealers, repair men and individual car owners throughout the United States. Interesting literature will be sent free of charge if you mention the AUTOMOBILE DEALER AND REPAIRER.

LOW PRICES FOR TIRES.—Most of our readers are aware of the fact that rubber tires were raised in price 15 per cent. July 15th. In view of this advance, readers will be especially interested in the announcement which appears in our advertising columns from the Excelsior Tire Co., 1775 Broadway, New York City. They have recently purchased \$25,000 worth of Hartford Tires and tubes and they guarantee to sell you these goods at a saving of 50 per cent. or more. Until present stocks are exhausted this company will continue to sell all kinds of tires at old prices. A word to the wise is sufficient. Consult the remarkable price-list, and in writing for tires mention this publication.

AUTOMOBILE SPRINGS

All Styles.

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TUTHILL SPRING CO.
221 W. Polk Street, - CHICAGO, ILL.

"Knlpe" Pat. Steel }
Ball Bearings. Brass } Balls.

1/2 Inch Shaft and Up.
No Fitting. Just Push Them On.
10 Cents in Stamps for Sample.

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454 The Bourse, Phila., Pa.

4X4 AIR COOLED MOTORS

\$80.00 each for Aug. only.

Transmissions,
\$23.00 each.

Write for Catalogue.

AUTO PARTS CO., 52 West Jackson St., Chicago, Ill.

Subscribe to the "Automobile Dealer and Repairer," \$1.00 Per Year.

Please mention the Automobile Dealer and Repairer when writing to advertisers.

Repair Materials That Do the Business

Repair men who are wise know that they can get better results with Goodyear Repair Materials than any others made. When you once make a repair with Goodyear material for a customer you have made a friend out of that customer.

He will be so pleased at the way the repair looks, the way it holds up, the way it saves his tire for him, that he will always come a long distance to reach your shop when he needs more work.

He will say to his friends: "See the good job I had done at So-and-So's repair shop. That's where you want to go if you ever need any repairs. Because So-and-So uses Goodyear Repair Materials and I know they're right."

And the reason Goodyear Repair Materials are always bound to be right is because only the highest grade of stock goes into them—instead of odds-and-ends and reclaimed stock.

Only the finest of pure Para Rubber and the strongest Sea Island fabric are used in Goodyear Repair Materials, just the same as Goodyear Tires.

If you have never used Goodyear Repair Materials, send for a book of sample sections. Just look, for instance, at our G-50 retreading stock, at a medium price.

This G-50 is about the most popular thing we have. Repair men are strong for it, saying it gives fine satisfac-

tion. It makes a particularly smooth and good looking repair, and wears great, too. It makes the kind of repair that a repair man can get a good price for, and is justified in doing it.

Our G-90 is a striking proposition. Note that this stock has one surface of cured rubber and the other of raw gum.

This can't be beaten for use inside an inner tube, where a large split or blowout has occurred. The cured black surface unfailingly keeps the stock from sticking to the other side of the tube when the cure is being made.

Our H. F. 31 Heavy Frictioned Fabric is equalled in no other line of repair materials, either as to quality of the fabric—best Sea Island—or the frictioned surface. It is giving excellent satisfaction nearly everywhere already.

Goodyear Bailey Tread Bands are semi-cured bands of high-grade tread stock with a surface of Bailey Buttons. They are endless and circular and make a wonderful retread.

Goodyear Air Bags for curing purposes and valve patches that really patch are among other notable features.

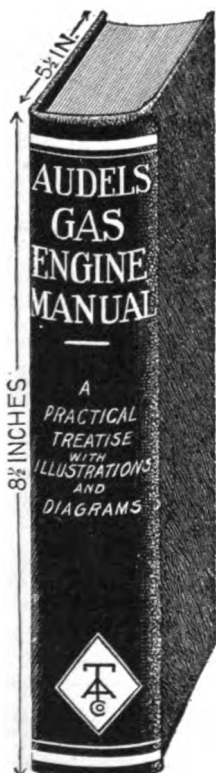
Send for samples now and examine the different stocks. Try out any of this line and then you will know why it will make more business, more money for you. Better send to-day before you forget.

GOODYEAR

The Goodyear Tire & Rubber Co., Sprague St., Akron, O.

Branches Boston, 669 Boylston St.; Buffalo, 719 Main St.; Chicago, 80-82 Michigan Ave.; Cincinnati, 317 East 5th St.; Cleveland, 2005 Euclid Ave.; Detroit, 251 Jefferson Ave.; Los Angeles, 949-51 So. Main St.; New York City, 64th St. and Broadway; Philadelphia, Broad and Fairmount Aves.; Pittsburgh, 5985 Center Ave.; San Francisco, 606 Golden Gate Ave.; St. Louis, 3935-37 Olive St.; Baltimore, 881 Park Ave.; Washington, 1026 Connecticut Ave.; Omaha, 2020-22 Farnam St.; Milwaukee, 188-192 Eighth St.; Memphis, 181 Madison St.; Louisville, 1049-51 Third St.; Dallas, 111 North Akard St.; Kansas City, 16th and McGee Sts.; Denver, 28 West Colfax Ave.; New Orleans, 706-16 Barronne St.; Atlanta, 90 N. Pryor St.; Minneapolis, 116 So. 6th St.; St. Joseph, 316-24 North Second St.; Providence, 886 Fountain St.

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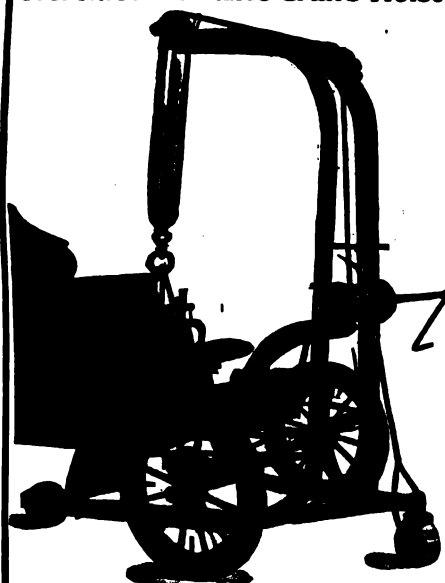
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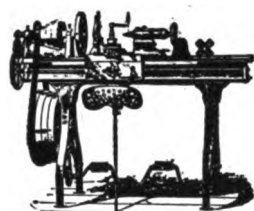
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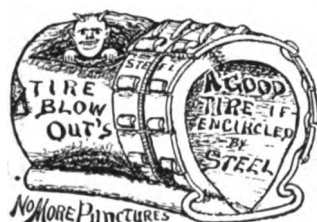
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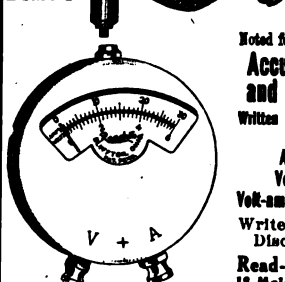
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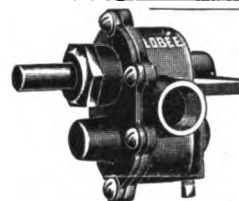
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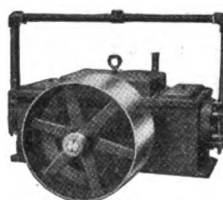


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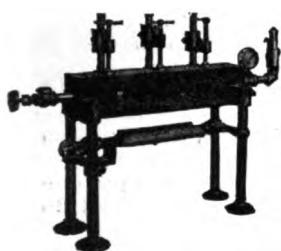
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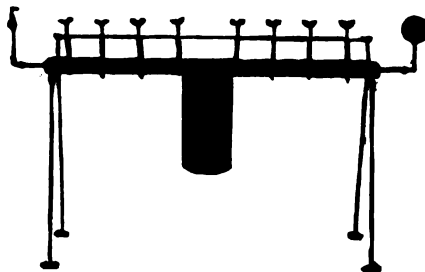
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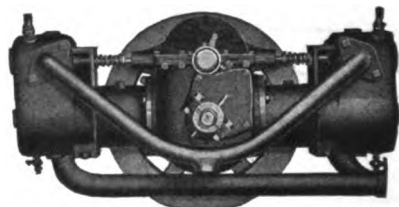
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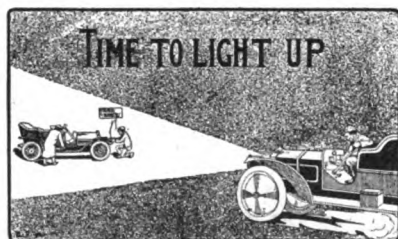
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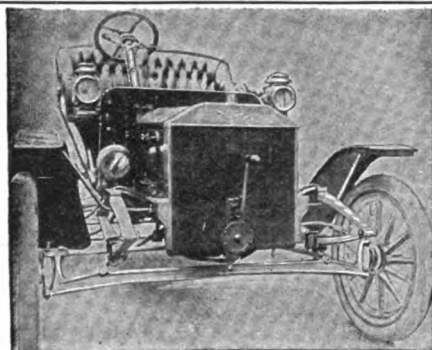
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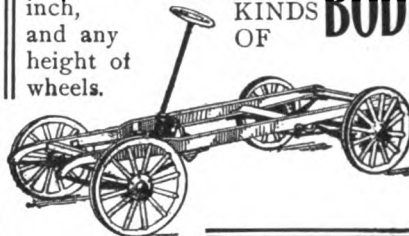
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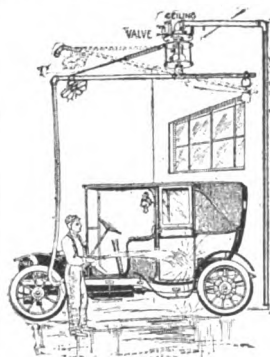
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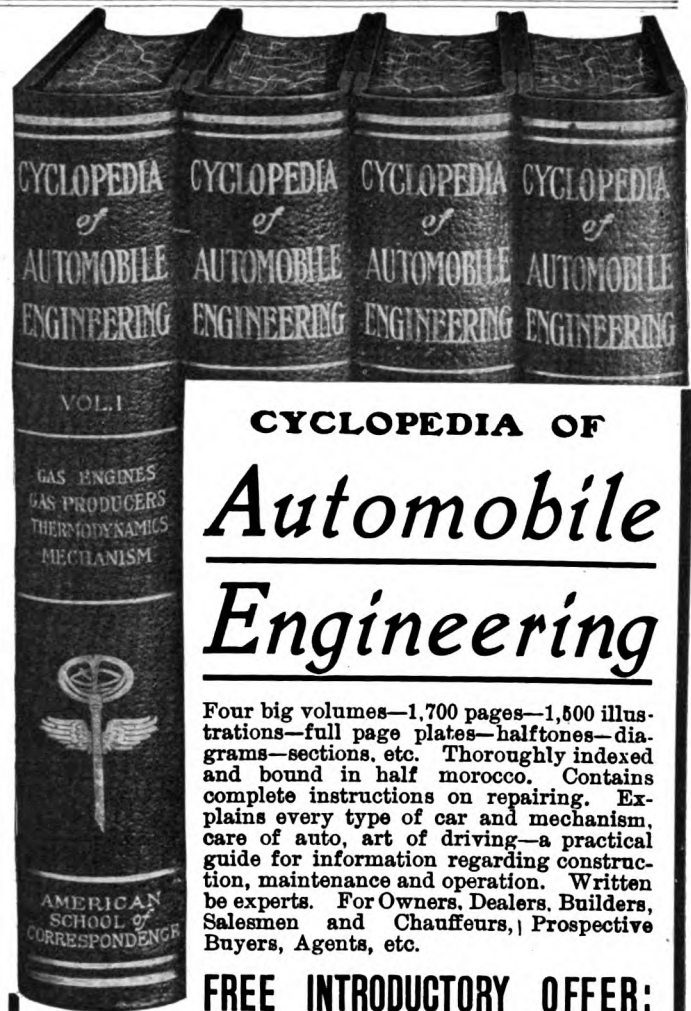
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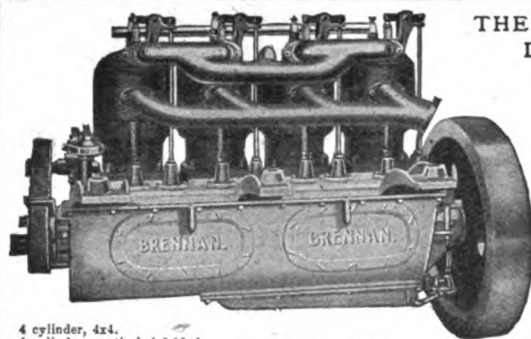
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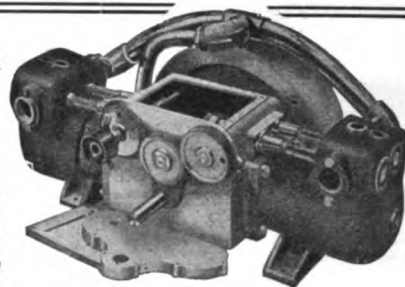
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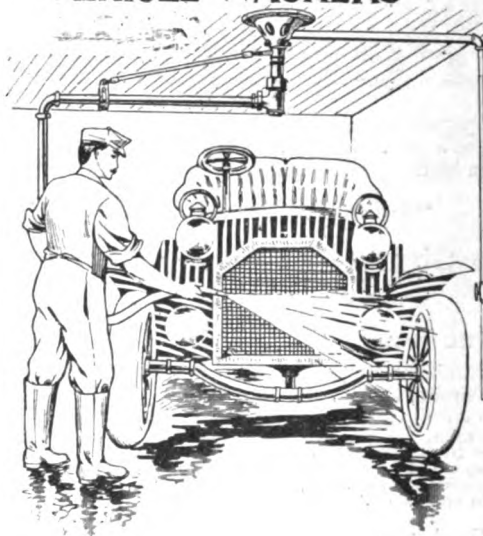
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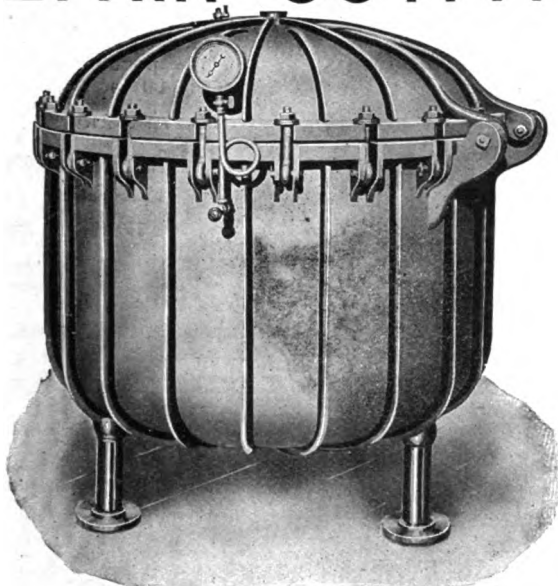
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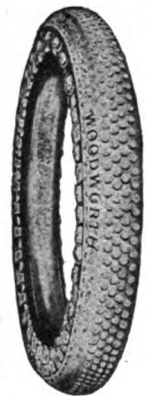
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Makes the repair permanent, as it produces the same effect as vulcanization. The acid cures the cement to the rubber or part to be repaired, which makes it one solid piece of rubber and impossible to separate.



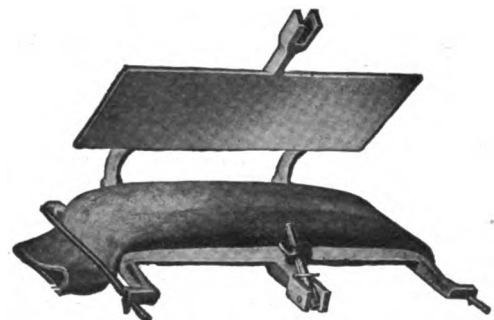
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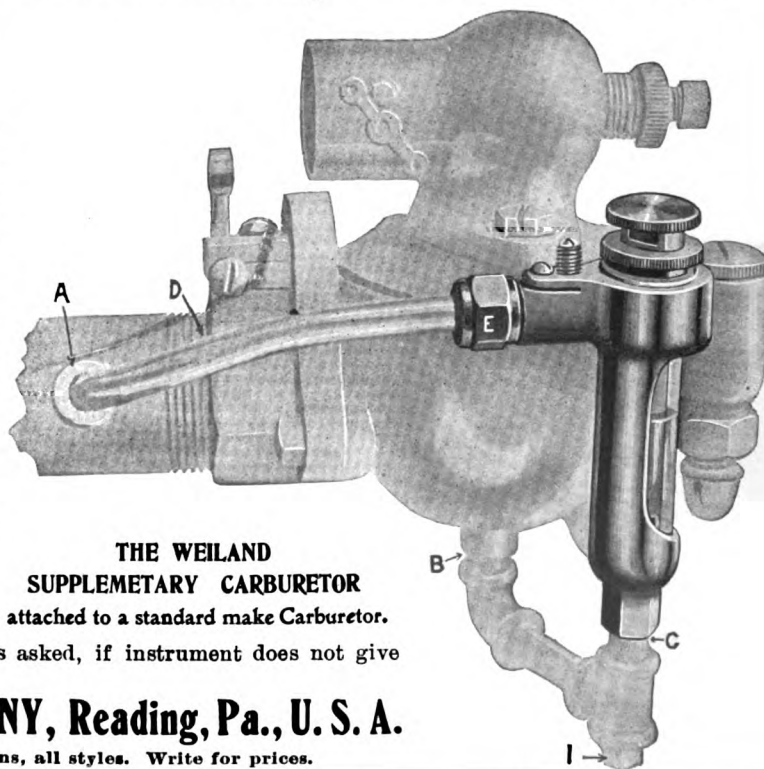
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the most" is a good saw to remember when selecting finish. Accessibility should be kept in mind. Somebody may have to put a wrench on those nuts. See if it can be easily done. In short, learn your mechanism. You will have to do this after buying most likely, and doing it pretty fully before will make your decision all the surer. The man who knows his vehicle succeeds with it much better than the one who does not; and success is what you want.

Finally, having bought with judgment, drive with judgment. Autos stand years of use, but abuse quickly brings trouble, just as certainly as care and skill bring pleasure and splendid service.

Skidding For Safety.

The average car driver reads with awe and wonder of the way in which experienced racing motorists deliberately *make* their cars skid in order to round corners after having approached them at such a high speed that it would be impossible to round the corner by simply *steering* the car. We do not wish to inspire the average driver to imitate such methods for the sake of speed, but the power to mimic the racing plan in a fainter and less lurid fashion is sometimes valuable to save appeals to insurance companies and even to save life. Such intentional skids are founded on the fact that, if a car skids when it is being already steered towards, say, the left, the inevitable effect of the skid will be to make the car turn further and faster to the left; the skid cannot under any circumstances turn the car the reverse way, *i.e.*, to the right. If the skid was a very bad one, such as could only be procured by a very full and sudden application of the brakes, coupled with a remarkably treacherous surface, the car might turn round—even turn round twice—but it could not under any circumstances turn to the right, instead of to the left.

The other day we were driving and the roads has as usually been liberally watered, and were about half-dried, and in a very treacherous condition, while our tires were all of the smooth pattern. A dog cart was driven out of a side road at about 12 miles an hour, right across our path and close under our wheels; there was no room to pull up, and if we had merely used the full steering lock, the car would simply have mounted the pavement, which was crowded. If only the car had possessed about three times its actual steering lock, we could have swung right around and gone down the continuation of the cross road, from the other arm of which the dog-cart had come. Knowing exactly how much the car would skid, what we actually did was to throw the helm hard over, and a fraction of a second later put the brakes half on. The result was a pretty little intentional skid, by means of which the car missed both dog-cart and pavement, and fetched up a yard or so down the side road. The point is that *no other action* could have avoided rather expensive damage to the car and trap, or, alternatively, the risk of manslaughter in mounting the pavement. The car was traveling about eight miles an hour on its second gear, and our view was blocked by a wagon at the corner.

Cleaning Mats.

Nothing improves the final finish of a car more than a clean set of mats, whilst the reverse is equally the case. Some chauffeurs paint the mats from time to time to restore them to their original condition, and undoubtedly this is the best method of keeping them bright. A simple method is to soap them with a good soap and scrub them well with a nail or scrubbing brush. This cleans them, but the mats are left patchy at places where they are worn much. Paint overcomes this although it does not make them look like new.

Driving in Car Tracks.

Keep out of street railway tracks whenever possible. In some cases the rails are smooth and of the exact width so that nothing will injure the tires, but such instances are rare. Where there is much car traffic there is a certainty of badly worn rail, and the number of switches, frogs, crossovers and turnouts increase with the demand upon the track. A worn rail will have rough edges. Long splinters may project from the edges, with effect much the same as knives cutting and grinding the tread or side wall, especially if the tire is wet or covered with oil. The average tire is composed of layers of fabric and rubber, and is thickest at the center of the tread, the side walls being much thinner. If the tire is small and the vehicle about standard tread, the wear will be at a portion of the tire not designed to resist such stress, and rapid decrease in the thickness of the side walls will result. At the other hand, if the tire is a large one it will run more upon the track and the wear will be more at the tread than at the sides and will not be so apparent. The front wheels of some motor cars are cambered and the wear will come more upon the tread, which will run upon the jagged edge of the paving blocks or concrete usually filling the space between the rails.

Moreover, the frogs and other combinations of rails made necessary by the curve cross, the turn-out, the crossover and switches, usually wear to a sharp point, which becomes as keen as a knife blade at the extremity from the grinding effect of the car wheels. Rubber when wet is very susceptible to puncture or cut, and if driven over frogs and switches destruction is invited, and often much damage results. The small tire may be rapidly destroyed by continual use on car tracks, and while the large tire is more enduring it must be affected by the same influences and the ultimate result is the same. While different forms of rail construction and installation produce different results, it will be seen at careful consideration, and verified by actual inspection, that all rails, whether or not worn, will grind away the tires.

Paint for Automobile Mufflers.

The muffler and exhaust piping of an automobile can be painted with a paint made as follows: Boiled linseed oil, 1-5 pound; japan varnish, 1-5 pound; spirits of turpentine, 2-5 pound; lampblack, 1½ ounces; pure powdered graphite, 1½ ounces; powdered oxide of manganese, ¾-ounce. First mix the linseed oil and the japan varnish well together, then add in the order named, and stirring all the time, the lampblack, graphite and powdered manganese. The solids should be added slowly while the stirring is briskly maintained. As the mixture thickens, thin it down with the turpentine, until the quantity mentioned is added. This paint should be used at once, for it dries rapidly and every time the brush is dipped the mixture should be carefully stirred. It is well to paint the mufflers while they are hot, first cleaning them thoroughly.

Good to Preserve Rubber.

As much turpentine should be slowly poured into the alcohol as the latter will take up, and when the solution is applied to the rubber the alcohol will evaporate and leave a fine deposit of turpentine, which, it is said, will prevent deterioration of the rubber.

For a Lost Washer.

If you have lost the washer for the tire pump connection you may upon a pinch use the packing for the valve cap, after punching a small hole in the middle of it, as a substitute.

Automobile Dealer and Repairer

A Magazine of condensed and compact information for busy readers.

OFFICIAL ORGAN OF THE NATIONAL RETAIL AUTOMOBILE DEALERS' ASSOCIATION

PUBLISHED THE MIDDLE OF EACH MONTH BY

THE MOTOR VEHICLE PUBLISHING CO.

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Post Office Box, 654.

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ADVERTISING RATES MADE KNOWN ON APPLICATION

NEW YORK, AUGUST, 1909.

Missing Numbers—Our readers are requested to remember that it always gives us pleasure to re-send numbers which have gone astray in the mails.

The Automobile Dealer and Repairer in Australia and New Zealand.

Mr. R. Hill, Matlock House, Devonport, Auckland, New Zealand, is our accredited representative in Australia and New Zealand for obtaining new subscriptions.

AN EASY REMEDY.

The rise in the price of tires has brought out the usual quantity of drivel about "the tire trust" and a "violation of the anti-trust law." Of course there is no tire trust, never has been, and quite likely never will be. About two years ago the price of tires was reduced about 40 per cent., and the raise of from 15 to 25 per cent. makes the present scale of prices less than at that time, although the price of crude rubber has advanced from 80 and 85 cents a pound to from \$1.30 to \$1.40 per pound.

One "moulder of public opinion" says that "the only way out of the dilemma is for the automobile manufacturers to stand for the extra cost of tires and not raise the price of the car to the purchaser." This is such an easy remedy it is a wonder the manufacturers are not making a grand rush to see which will be the first to adopt it. It seems especially easy in view of the fact that the manufacturers' committee in its brief to the ways and means committee of Congress made the significant statement that "it was doubtful whether 20 of the 253 manufacturers of automobiles in the country could show a fair profit."

We hold no brief for either car or tire manufacturers, but the efforts of some of the newspapers to "split the ears of the groundlings," are tiresome. The facts of the matter are that there are scores of tire manufacturers and hundreds of car manufacturers. No one is compelled to buy either a car or a tire of any particular make or style or cost. His range of choice is so wide that the instant he appears in the market for either, he is bewildered by the number of kinds and the sweep of prices. Moreover, each manufacturer is altogether too painfully aware that if he fixes his price too high his trade will soon leave him. In the case of tires the price for the past year has been too low, and the manufacturer had an alternative of two things—either go out of business or raise the price

and make a living. He chose the last named and no blame attaches to the choice.

Our concern is in behalf of the car owner and purchaser, and the best advice we can give him is to take better care of both car and tire. Many drivers and owners seem to be possessed of an insane idea to ruin both as quickly as possible. With only fair care as compared with recklessness, the usefulness of tires may easily be doubled. If care of this kind were but the rule rather than the exception, the supply of tires would soon again be equal to the demand and prices would fall of their own weight.

No one can foresee what may happen in the years to come, but at present a monopoly of either tires or cars is simply impossible, and prices are fixed by the inexorable but righteous law of supply and demand.

COST OF CARS.

Those who look for a further substantial reduction in the price of automobiles will be disappointed. The cost of a carriage alone that is strong enough to bear up the weight of its motive power while being propelled at from 40 to 50 miles an hour on ordinary country roads, is considerable. It must be submitted to strains and wrenches that an ordinary horse drawn carriage could not withstand for an instant.

The current year has marked the advent of a surprisingly useful and satisfactory car for from \$800 to \$1,200. Manufacturers, while in most cases recognizing that sooner or later the field of medium priced cars would be entered, have been prevented for many reasons from doing so. But it is to be borne in mind that when once cheapness is started there is always a chance for impetuous and unguarded action. If, for instance, too light construction is adopted, the result may be a car of less weight, cost, etc., but it cannot give good satisfaction or withstand hard usage. To purchase a "popular priced" car of less serviceable life and with a high operating cost both for actual operation and maintenance, would be less satisfactory in the end and more expensive than the present type high priced but lower operating cost, car.

What is needed is a reliable low priced car that will not quickly get out of tune and will give as much speed as the average man should expect.

LOWER PRICE FOR GASOLINE.

A reader asks if there is not a prospect of a rise in the price of gasoline. On the contrary, there is a prospect of a temporary reduction in its price. Not only has the Standard Oil Company stored something like 100,000,000 barrels of oil, so rapidly has production outstripped even the increased consumption, but this greatest of all trusts—although by no means the worst one from a public standpoint—has now more than one hundred rivals. Of course these independent producers are merely annoying to the great trust, and not specially dangerous. Their relations to it are something like the August fly buzzing about the contented ox in the clover. They may put the price of oil down, but the Standard Company can meet any figure they are likely to make, and if necessary, reduce prices to a point that no other competing company can sell for at a profit for any length of time. Of course this would cut big dividends or necessitate passing them altogether while the war lasted, but terms would be reached before permanent damage had been done to the trust.

Another factor must be considered. Under the new tariff bill, which will be made a law before this reaches our readers, the whole world may sell oil in this market without hindrance. Although this may not result in increased imports it will at least prevent a further rise in

price, the general effect not being absolutely foreseen by experts.

And still another condition is interesting to the consumer. In the Oklahoma and Illinois oil fields, from which an immense supply of oil comes, the petroleum lies in great lakes or "pools" far down in the earth. Each neighboring oil well owner draws his supply from the common source, and as production increases and the price goes down, though there is a natural desire to curtail in order to keep prices up, it is difficult to induce any one of the producers to take the initiative, since he who stops production while the others go on pumping knows that the owners of wells in operation are drawing not only from their own wells, but draw his, too. Nor does he know what day the oil may cease flowing, and so he returns to pumping. Thus, unless all the oil well men shut down at once, there is no real restriction of the supply and the production must be continued at a maximum, willy nilly.

Gasoline now sells at from 20 to 25 cents a gallon retail, and the immediate prospect is for lower prices.

NEED OF A GUN.

Although it may not be frequently necessary to use a revolver, tourists should not neglect to have one in the car within easy and quick reach, for when the need comes it is imperative and nothing else can supply it. There seems to be a constantly increasing number of desperadoes in the country, and they are willing to take desperate chances with those whom they suspect as having money or other valuables about their persons. Desperadoes, did we say? There are also what may be termed desperadoesses; judging from this story which comes from the plains of eastern Colorado:

Clark M. Babbitt, a broker from Buffalo, N. Y., and A. Y. Bartholomew, driver of a Pierce car in the Glidden tour, arrived in Denver late one night recently with a tale of being held up by two women bandits on the lone prairie, thirty miles from Sterling, the previous stopping place.

"Stop right where you are and hand over your coin!" was the command of one of the women from her saddle, as she flourished a revolver. And Babbitt and his driver did as they were told. Between them they gave up \$193 and a gold watch.

"We were both sitting on the front seat when we heard a woman cry out," said Mr. Babbitt. "We slowed up and two women rode up and one made the demand and presented the six-shooter. We were both so taken back that we did as we were told. There was not a house nor a soul in sight at the time. They were some distance ahead when we first noted them and we naturally supposed they were a couple of the Wild West cowgirls we had often read about. The girls kept galloping in our direction and as we were proceeding slowly, it wasn't long before they were in hailing distance. They waved to us first and taking it for a friendly salutation of the road we all waved back. Some few words of greeting were exchanged when one of the girls called out:

"Hold on there a minute, I want to tell you something."

"Better stop," I told Bartholomew, and he came to a halt.

"Then while the one girl kept us covered with her revolver, the other rode up beside the machine and held out her hand. I handed over my money and Bartholomew produced his watch and pocketbook. Without waiting for anything more the girls wheeled around and rode away.

"Both the girls were young, wore wide brimmed hats and brown khaki suits. I also noticed that one had on

brown stockings. They rode astride and were dandy riders."

Of course, in a case like the foregoing, the one who first has a gun leveled has all the advantage, but the chances are that if either of the frightened passengers had met the demand of the woman bandit with a quick shot, the outcome would have been different. Any one who has got the sense to be a highwayman or highwaywoman, also knows that in a case of that kind the odds are much against them in case the victims put up a fight.

THE FACE OF THE EARTH.

One of the reasons given for the slow progress in aerial navigation, and especially for the failure of the heavier than air cars to rise far up into the heavens and get somewhere, rather than fly in circles near the earth's surface, is motor difficulties. But the engine of an automobile has far more severe work to do. It is true that if anything goes wrong with the automobile engine, the passenger is on the earth's surface, while the passenger of the flying machine is likely to come down "with a dull sickening thud," but the aerial engine never gets a jar or a wrench or meets with an obstruction. If it will run without a skip five minutes, there is no reason why it should not run without a skip or a miss for five hours. The only requirement is suitable construction, care and attention, and the least possible weight compatible with its requirements.

But suppose flying be finally accomplished to the extent and with the success that its most ardent devotees hope for? Will it even then be as attractive to the average mortal as motoring? With decent highways the automobile will travel as fast as the flying machine; it will carry as heavy loads as the flying machine; it will be far safer than the flying machine; and it will travel at less cost than the flying machine.

The heavens are the place for the fowls of the air, and the sea for the monsters of the deep, but man is far happier, safer and more in his native element, when he "lives and moves and has his being" on the face of the earth.

A WORD TO OUR READERS.

We take particular pains to solicit no advertising from irresponsible people, and believe we haven't an advertiser who cannot be depended upon to fill any order which may be sent to him as promptly as possible.

We suggest that if a subscriber orders good from an advertiser and doesn't get served promptly, that instead of blowing him up and intimating that he is a fraud and swindler of the first water, as some people are rather inclined to do, that it would be better to write a pleasant letter and find out whether the original communication was received or not. Letters go astray in the mails sometimes. Occasionally a post office employe thinks he needs the money contained in a letter more than the sender and appropriates it.

The New York Herald, a while ago printed the following: "Last year post office inspectors arrested 101 post-masters, 40 assistant post-masters, 65 clerks in post offices, 10 railway postal clerks, 27 letter carriers, 43 mail carriers, and 19 employes in minor positions in the postal service for stealing money from letters.

It should not be inferred from the foregoing, that the employes of the post office department are as a rule dishonest or any more dishonest than employes in general. The government, however, is as liable to be imposed upon as any one else.

Considering the large number of postal clerks employed in the United States the above arraignment is

not so severe as it seems on the surface. It is a fact, however, that almost every one doing any considerable amount of business has more or less letters stolen.

If you send a sum of money to an advertiser and don't hear from him promptly, write to him again, and tell him what you have done and ask him if he has received your letter. It will be time enough to denounce him in scorching terms when you find out that he is to blame. Sometimes it happens that a reader fails to give his post office address, and in that case the only thing for the advertiser to do is to wait until a complaint is received.

It is just as well to assume that people in business are honest until you find out otherwise. Parties who advertise their goods are generally prompt in making shipments.

These remarks are inspired by looking over a few complaints sent to the Standard Sales Co., 1779 Broadway, New York City, who, it will be remembered, offered in our May issue to send a 75 cent "Fry" spark plug for 10 cents. In a few instances the plugs went astray and in several cases the parties who sent the money wrote strong letters to the Standard Sales Co. In each instance where a plug was lost in transit the company sent another one.

It is always safe to remit by money order or in a registered letter or by draft.

GOOD BUSINESS PROSPECTS.

The business world has at last awakened from its long period of lethargy. As far as human foresight can penetrate there is not a shadow nor a cloud, nor anything potentially disturbing, upon its horizon.

The tariff has at last been settled, and probably as wisely as could have been expected, considering the varying and conflicting interests seeking special advantages.

Crops are abundant. The great staples, wheat, corn and cotton, bid fair to be record breakers, and the demand for them at good prices is all that could be asked.

There is again a call for labor, and wages are high enough to enable any industrious man to live well besides laying up something for the inevitable rainy day. Strikes are few and such as exist seem to be pervaded less by unscrupulous hatred and lawlessness than has too often been the case.

There is no lack of money. With reasonable confidence there never need be in this country, so long as there is a constantly increasing amount of currency per capita.

We look for one of the most prosperous years from now on that the country has seen for a long time. There will be buying and selling, planning and building, coming and going, and none need fail to share in their benefits if they but set their faces toward the sunlight of hope and confidence, and keep in the van of progress and perseverance.

AUTOMOBILE EFFECTS.

One of the results of the prevalent use of the automobile—and one not expected—is its effect upon summer resorts. The fact is, there is more pleasure in touring or in taking week end trips into the country than in extended sojourns at hotels in either the mountains or at the seashore. The best proof of this statement lies in the business done by the railroads reaching the Jersey coast resorts. Last year the country was hardly recovering from the panic, and many people who in other years lived at the seashore during the heated term were forced to stay at home. But the cry of hard times isn't heard any more and yet the people that have the money

are not living at the coast towns, and in consequence are not travelling to them by rail. They now have autos, and prefer to run to a different wayside inn on their little weekly journeys rather than patronize a hot railroad coach. The automobile inns along the roads are profiting. They all report plenty of business and plenty of money. But the towns that live on resorters and the roads that cater to them are suffering.

But another phase of the situation was recently expressed by a Pittsburg manufacturer, who said he was tired of sending his family to the seashore or mountains. "I want to see them oftener than it is possible when they are hundreds of miles away," he said, "and I'm up to my ears in business. So we bought a car this summer, and wife and the kids are going to stay at home. I am a business man, and I figure that the cost of the car, with a chauffeur to run it, would be at the end of the season about what it would cost me to send the folks away—and I'd have the machine left. That's worth considering, not to speak of the fact that I have a good time all summer long with the young ones."

Moreover, railroad passenger receipts are shrinking in summer because car owners find it pleasanter to travel by automobile than on the rail, since they must keep their car anyway.

But this is but the entering wedge, so to speak. It will not be long before the tendency will be far greater and summer railroad travel and summer resorts will be reduced more than one-half.

All so-called globe trotters must take off their hats to Charles J. Glidden, who has twice encircled the earth with an automobile, covering 46,528 miles in 377 days of actual touring. In doing this, he has travelled extensively in 39 countries, and Mrs. Glidden has been with him in all of his travels. He expects to finish his world tour in 1911 and complete the distance of 50,000 miles outlined. The tour when complete will have cost \$100,000.

LESSONS FOR DRIVERS.

Carelessness and Ignorance Responsible for Most Accidents.

Nothing is to be gained by minimizing the effects of careless driving or by covering up cases of accident. On the other hand, the quickest and surest way to correct the evil is to give its results as wide publicity as possible.

Moreover, it is about time to put in the category of falsehood the repeated claim that in proportion to the number used more accidents occur to horse-drawn vehicles than to automobiles. The exact opposite is the truth, and no elaborate argument or juggling with figures is necessary to prove it.

But all this casts no reflection whatever on the automobile, any more than it is any reflection upon a razor when some rash mortal cuts his throat with it. The automobile is the safest vehicle ever used by men. Primarily every accident that occurs is due to carelessness or stupidity, and might have been avoided.

Result of a Quick Turn.—An automobile containing a party of four was wrecked near Paterson, N. J., and the occupants all thrown out and injured. The accident was caused by turning out too suddenly while passing a farm wagon at high speed, the car swerving into a rut and finally crashing into a tree.

Just an Ordinary Mud Puddle.—A man was instantly killed, his wife badly injured and two nieces

cut and bruised by his car striking a trolley car near Cheshire, Conn. The driver of the automobile attempted to turn out for a puddle of water in the road, but the car skidded into a trolley car and all the occupants were thrown out with the result stated.

Turning a Corner.—A big car was wrecked near Watertown, N. Y., while going at a rapid rate of speed and attempting to make a quick turn to avoid a team. The sudden application of the brake caused the car to overturn, and the occupants were all more or less injured.

Plunged Over a Bank.—A party of three were out on a so-called joy ride near Lafayette, Ind., and while speeding along a narrow road the car in some way swerved and plunged down a steep embankment. One man had his neck broken, another received a broken ankle, and the car was wrecked.

Brakes Did Not Hold.—Owing to the failure of the brakes to hold near Wilkes-Barre, Pa., a car dashed down a mountain, killing one woman occupant, fatally injuring another, and bruising the others of the party.

Result of a Tire Collapse.—Near Rochester, N. Y., a car was travelling at a moderate pace when at a short curve in the road a tire collapsed and it turned turtle, pinning the five occupants under it, killing one and injuring the others.

A Head-On Collision.—Crossing a narrow bridge near Pelham Park, New York City, two cars came together head on. The occupants were all more or less injured and the cars had to be taken to a garage. All the explanation that could be had was that each expected that the other would turn out.

Brakes Failed to Work.—Near Seymour, Ind., a party of five were driving down a hill when the brakes failed to work. The car ran away, overturned, and all were caught beneath it. One had a broken rod thrust into her lung, another a broken leg and a cut under the eye, another a broken shoulder, another an injured back and another a bad wound on the head.

Over Fifty Miles an Hour.—Four persons who refused to give their names ran their car into a cornfield while going at the rate of fifty miles an hour, and so completely wrecked it that it was abandoned. The cause of the sudden deflection of the car was a deep rut in the road. As the car turned for the ditch it headed directly for a tree, and to avoid this the driver turned it directly into the cornfield. The two young women of the party were much injured.

Skidded a Block.—On upper Broadway, N. Y., a large automobile ran down a woman and her two daughters. So rapidly was the car going that even after its wheels were locked by the brake, it skidded over the pavement nearly a block before it could be stopped. It was reckless driving and the driver himself was put under arrest.

The Tire Burst.—Going at the rate of about 60 miles an hour near Los Angeles, Cal., a car crashed against a buggy, and then skidded off into a ditch. The occupants were thrown out; the car was demolished, and from all the information gained it was all due to the high speed which caused the tire to burst.

A Tire Blew Out.—A man was jogging across a bridge near Montpelier, Vt., when a tire blew out with the report of a rifle. The rear part of the car skidded one side and struck the side of the bridge. Although the driver was not seriously injured the car has been sent to the factory for repairs. The owner of the car was astonished that the blowout

should have occurred without apparent cause, but this shows that he is not an experienced automobilist.

Death in His New Car.—Within three hours after he had purchased his new car the owner was lying a corpse by the side of the machine in Dearborn, Mich. He was taking the car home and took the wheel to drive, the demonstrator being by his side. An electric street car was heard approaching from behind and he turned in his seat to look at it. It is supposed in doing so that he turned the steering wheel as well, thus throwing the car over on the railroad track. It was struck by the car, and the demonstrator was thrown into an adjoining field but the new owner was crushed into lifelessness.

Ran Into a Curb.—While driving rapidly in San Diego, Cal., at night the driver of an automobile failed to see a buggy in front of him, and was just about to dash into it. He knew it would be a case of hitting the buggy and killing some one or going onto the pavement and smashing his car to pieces. He chose the latter course, and was thrown out and his car completely demolished. Although the driver will recover he will be laid up some time from his injuries.

In St. Louis, Mo., an ardent automobilist was running at a pretty good clip and did not see an approaching electric street car. He was unable to stop and concluded to jump before the crash came. This probably saved his life, although he is bruised and lame from head to foot. It may likewise be stated that the driver had only used the car a few times, and was not familiar with its working.

Automobile Law.

The courts have been busy during the past year deciding questions of automobile law. Among the most important rulings which have become established law, are the following:

The employer is not liable for the acts of his chauffeur while the latter is driving contrary to authority or for his own personal use.

The employer is not liable under such circumstances as above mentioned, even if the employer loaned the automobile to the chauffeur.

A father is not liable for injuries committed by his son or daughter to whom he has loaned his automobile.

The automobile is not an agency dangerous, *per se*.

In conclusion, attention should be directed to the dangers of automobile driving and to the risk which the fast driver runs in respect to human life. Public sentiment is such that the causing of death by mere accident, or even when the deceased was wholly at fault, the automobile driver may find himself facing a serious criminal charge. The possibility of being compelled to answer an indictment for manslaughter should ever be on the minds of even careful drivers. Several convictions have recently been had for killing persons. In New York City a chauffeur was indicted for murder and convicted of manslaughter in the first degree. He was sentenced to not less than seven years' imprisonment.

Two recent English cases of manslaughter, committed by drivers of automobiles, are of interest to automobilists. They establish the following rules:

Drivers have no right to take honest chances.

Great speed is sufficient to convict of manslaughter.

Prices for automobiles will be reduced with the cost of selling—of marketing—and very little otherwise.

If you find what you want here, please tell your friends about it.



TIRE TROUBLE AND COST.

Some Things to Do and to Don't to Save Expense.

BY JAMES F. HOBART, M. E.

Probably there is not an automobile owner or driver in existence who does not desire to eliminate tire trouble and cost. Many a car would be little expense to its owner could the tire cost be cut out or even cut in half. It seems strange to the writer that drivers of cars will pay so little attention to favoring a tire when a little care would lessen the cost and the trouble immensely. In view of the fact that "fool stunts" continue to be done with tires, it must be assumed that drivers do not understand, or at least do not realize, the unnecessary trouble they put upon tires which could be entirely prevented by a little thinking.

Were it not for the unreasonable use of the clutch and the brake, it is safe to state that a good tire would almost outlast the drive-chain or its sprocket wheels, or wear as long as the cylinders will go without re-boring! Just think a minute and determine the load which rests upon the tires; then consider the power which must be applied through them in order to move the car along! A car which weighs 2200 pounds, ready for the road, exceeds, when four 150 pound passengers are aboard, 2800 pounds, and this brings a load of 700 pounds upon each tire, assuming that the load be evenly divided.

Suppose the car is traveling at the rate of 40 miles an hour and exerting 30 horse power; what is the pull or strain between the ground and each of the driving-wheel tires? A speed of 40 miles an hour corresponds to about 3530 feet per minute, and 30 horse power corresponds to 990,000 foot pounds; therefore, the traction, or amount of pull between tire and road, will be about 280 pounds, or 140 pounds to each tire. This pressure is being exerted all the time the car is running, and the force exerted has a tendency to pull the tire to pieces and to tear up the surface of the road. A wheel does not roll along the road; it partially slips along. There is not an instant, while the car is under power, that each driving wheel does not slip an inch or more to each revolution, and the forward, or non-driven, wheels slip also, though to a less extent than the driving wheels. This is the case with any elastic wheel, and the more elasticity in the tire, the more the slip, or, to be more technically correct, the greater the "creep."

The matter noted above, the "creep" or slip, is entirely independent of the speed of the car and depends entirely upon the power of traction exerted through the wheel or tire. When the brake is applied, the slip takes place in the same manner, but in the opposite direction, the circumference of the wheel having a greater velocity, so to speak, than the amount of space passed over. When the wheel is driving the car, the travel of the wheel circumference is greater than the space passed over, and the difference between them is the amount of slip or "creep."

Fig. 1 shows the matter of creep. Let it be considered that the surface of the street, A, B, is laid off in equal parts—inches or some other convenient dimen-

sion—and the circumference of the wheel is marked off in a similar manner to the same scale, as shown from C to D. When the wheel revolves in the direction of the arrow, the marks from C to E and A to E should come together and coincide exactly were there no slip or creep of the tire on the ground. But something else happens. As soon as the tire comes in contact with the ground at E, the pull being in the direction of the arrow, the resistance of the road causes the rubber tire to be compressed slightly beyond E, toward F, and the compression continues until the car moves along instead of compressing the tire material any further. The tire, therefore, acts like a spring, being compressed by the power applied until a point in the compression is reached where the tension or spring in the tire is sufficient to overcome the drag of the car.

During the slipping action, there is nothing for the portion of the tire to do, which is passing at F, except to drag on the ground a distance equal to the

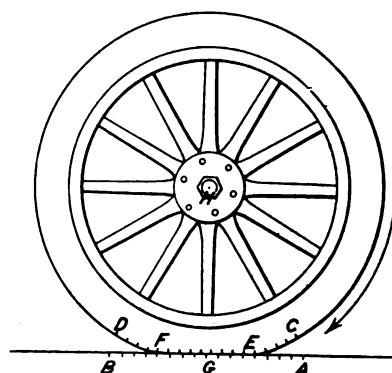


Fig. 1—Slip due to traction.

slip or creep. We will assume that the actual creep is very small; say, only one-half inch during one revolution of the wheel. But this is not all the creep by any means. If it were, the auto-driver could neglect it entirely. As the wheel passes over the center of its bearing upon the ground, it will be seen, at a point directly underneath the axle, that the space marks on the tire are half way between the marks on the ground. It will be assumed that this is the creep for an entire revolution instead of for the small arc of one-half the distance, F E. Now, as the tire passes out of the compression put upon it by the weight of the car, the elasticity of the tire material exerts itself in the opposite direction to that described at E, and, as the driving pressure is gradually released, the tire crawls forward from F, toward E, until the compression due to power pull is entirely released, and it is found that the marks agree at F, as they did at E, with the exception that there is one less space between D F than there is between B F, thus showing that the slip between E and F has been one entire space. If the action were a simple compression and release of the elastic material of which the tire is concerned, then the slip would be one-half space from E to G, and one-half space in the opposite direction between G and F, thereby effecting a simple compression and expansion without any slip whatever upon

the ground. But this is not the case. The wheel marks get ahead of the ground marks from E to G, as stated, and, instead of falling back again between G and F, the marks get ahead another half space, thus making it necessary for a portion of the tire at least to slip a distance of one space upon the ground during each revolution of the wheel.

And this is not all the slip to be accounted for. It will be assumed that the diameter of the wheel at C is 34 inches and that the radius is 17 inches. The wheel is compressed under its 700 pounds load until the radius G H is only 16½ inches, thereby making the working diameter of the wheel 33 inches instead of 34 inches. And here is right where more trouble comes aboard. The circumference of a 34 inch wheel is about 107 inches, while the circumference of a 33 inch wheel is only about 104 inches. This gives a difference of 3 inches to be taken care of by compression and stretching, as above described, resulting in an additional slip or creep of 3 inches, making 4 inches in all, for the tire, or a portion of its bearing surface to be dragged over the road. Is it any wonder that, when a tire is loaded with 700 pounds, and pushed over the road by a force of 140 pounds, the rubber is torn to pieces quickly and that the best of tires do not last very long?

The action described above as slip or creep is the same as that which always takes place between a moving belt and a pulley. The elasticity of a leather, cotton or rawhide belt is sufficient to allow the belt to fall behind on the driving pulley, and to get ahead of the driven pulley to the extent of about 2 per cent. of the entire number of revolutions. Thus, two shafts are belted with equal pulleys. The driving shaft runs at 100 revolutions per minute and the driven shaft is found to revolve only 98. The 2 per cent. is absorbed by the belt in going on and off the two pulleys, much the same as the tire crept ahead of the road in being compressed under the load, and in recovering from that compression as the wheel rolled to a new surface of bearing.

Belts, running upon smooth and polished pulleys, are torn to pieces by the slip or creep. Sometimes the surface of both belt and pulley become so polished that they are very bright and smooth, but the continual creep eventually wears them away, until the belt is too thin to withstand the tension necessary to transmit the required power. If there is so much wear between two smooth surfaces, what must happen when a soft rubber surface is dragged across gravel, concrete, stone or brick paving and sometimes broken stones and clinkers? Don't see how tires last to get home; do you? It certainly shows us that we should keep tires pumped up to the limit, never running a foot with a flabby tire, and, furthermore, the safe working, or "limit," load on any tire should never be exceeded; for the greater the load, the worse will be the cutting, tearing, scraping and shearing action in the tire as it is dragged over the roadway.

With all this natural wear to tires, it stands the car owner well in hand to take exceedingly good care that no extra and useless wear is put upon his car tires. The sudden application of brake and clutch can only result in an enormous increase in tire slip and wear, as will be shown by the following example and illustration.

Just back the automobile against a convenient corner of a building, as shown by Fig. 2, and bring a spring, or some other suitable portion of the machine, against the building, as shown, in a manner which will prevent the movement of the machine during the test.

Attach a rope, as shown at A, raising the mud guard, if necessary, to permit the rope to lie horizontal. Borrow a heavy spring balance from the iceman and make it fast to the rope, as shown at B. Tie on another bit of rope, or a chain, and fasten it to a lever, as at D. Nail a rough board against the building, as shown at C, and fasten cleats upon this board in such a manner that the lever can be applied, as shown, to slide wheel A, upon the ground.

At F, place in, or upon, the ground, suitably fastened so that it cannot move, such a surface as it is desired to test the slip of the wheel upon. A section of concrete may be prepared in a shallow box and placed under the wheel, or some bricks may be set in another box. Broken stone, gravel, sand packed hard, loam; in fact, each and every variety of road material may be tested by placing small surfaces of each under the wheel in succession. See that the load desired—700 pounds in this instance—is placed upon the wheel; then manipulate the lever until the wheel slides around, keeping the rope at the extreme top in every test, and note the number of pounds registered upon the spring balance at the instant the wheel slips.

It may be quite a task to obtain an exact reading

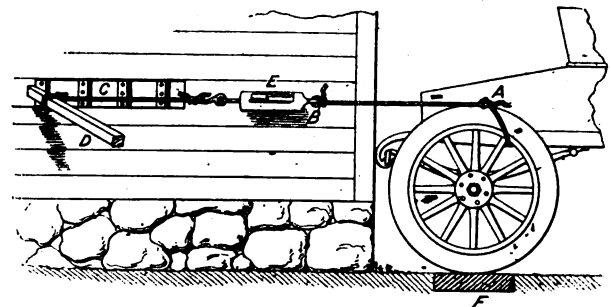


Fig. 2—Weighing the slip of a wheel.

from the scale, as the indication can only hold for a very short time, at the instant the wheel begins to move. It will then be in order to make the balance self-registering, which is easily done by applying a thin ridge of common putty along the graduations at E. Apply the putty in such a manner that it will be flattened down along that portion of the graduations which is swept over by the index or pointer; then it will only be necessary to make the test and look at the putty register and take the reading at the limit of the portion swept over by the index.

The clutch should be thrown out during these experiments, in order that no force may be applied to hold the wheel from turning except its friction upon the surface beneath it. It may be necessary to remove the chain or to jack up the other wheel, in order that no undue resistance may be applied through the equalizing mechanism. In any event, the test must not be made except under the conditions that the wheel A can revolve freely when it is jacked up from the surface F, the object being to remove all causes tending to retard the wheel except the friction upon surface F.

With some surfaces at F it may require 700 pounds pull registered at E to slide wheel A. With other surfaces under the wheel, the resistance may be much less. With anti-skidding mechanism attached to the wheel, and brick paving at F, it is barely possible that the two may interlock so that more than 700 pounds pull will be required to slide wheel A. It may be safely accepted, however, that 700 pounds pull is the

maximum, under favorable conditions, which can be applied to the wheel surface to slide it along the road. The traction force, is, as we have found, only about 140 pounds, and it has also been shown that it can do things to the tires under ordinary running conditions.

How much more, therefore, must be the strain upon the tires when 600 to 700 pounds pull is applied to slide the tires, by suddenly applying the brake or the clutch?

When a man throws in the clutch with the high speed gear in mesh, with the car at rest, and it jumps forward to full speed in a very short time or run, you may rest assured that a tremendous amount of force has been suddenly applied to the scraping point between tires and road. When a wheel slips with 700 pounds of load upon that wheel, you may know that there has been "somethin' doin'" not only between the tire and road, but in the axle and in every portion of the transmission. A very apt illustration of this very point has actually happened during the writing of this story, within 100 feet of the writer. A neighbor's car suddenly stopped as he ran into his door yard, and he was unable to make the machine run either forward or backward.

After the usual investigation, the cause of the stoppage was found in the breaking of an axle just outside of the collar. The fit was so good that the wheel did not come off, but stayed in place and held up its share of the car. Upon taking out the axle parts, it was found that careless clutch manipulation was the primary cause of the break. It had been the habit of the former owner of the car to throw in the clutch with the high speed gear in, and to throw it in "all standing," letting the car start with a jump, and the engine slowed down to meet the speed of the car.

Abundant proof of this handling was found in the axle between the collar and the middle of the keyway length, for the shaft had been twisted at that point until the keyway was twisted out of line nearly its width. This showed that the clutch had been thrown in very suddenly while the engine was at full speed, and, no matter what gear chanced to be in use, the shock to the transmission was a very severe one. The misuse of the clutch did not directly cause the breaking of the axle, but it may have caused the strains which eventually resulted in the breakage. The present owner of the car was not the "clutch fiend" who twisted the axle, as was proved by the fact that the wheel had not been removed before during the two years the present owner had driven the car, and by the further fact that a portion of the twisted keyway had been filed at some previous time to permit the key to be inserted.

This accident occurred so very timely, in connection with the writing of this article, that the writer desires to add emphasis to his caution about two things to do, and two not to do, viz: Keep the tires well inflated, and never overload the car. Always throw in the clutch gently, and as slowly as the moment will allow. And take extra caution in using the band brake. This will twist axles and scrape tires as badly as the misuse of the clutch, and, as they act in directions opposite to each other, they both, if permitted by the car owner, will surely spoil many tires, twist axles, damage clutches and brake rigging, and injure every member of the power transmission, from the engine to the tire. And, to add to the foolishness of the above, the writer has seen some drivers (?) of high grade cars use the band brake for slowing down, without stopping or disconnecting the engine!

DEFECTIVE GEARING.

Why Badly Cut Gear Teeth Absorb Power and Make Trouble.

BY SYDNEY F. WALKER, M. E.

The gear wheels, unfortunately, do not get as much attention as they should, if motoring is to be carried on as economically as is possible. The gear box is not often the seat of a stoppage trouble, as the ignition and carburetor outfits are, and the idea too often prevails that as long as there is plenty of grease in the gear box, no further trouble need be taken. Like so many other things, this is half true. Keeping the gear box well lubricated will minimize any trouble that may arise, and will lead to a complete absence of gear box troubles, if care in handling the gearing, when changing speeds, is employed, provided the gear is well fitted. And it is just here that some of the otherwise not easily understood troubles take their source.

The essence of motoring is power, and anything that will lessen the power available at the driving wheels may lead indirectly to other troubles. When any machine is short of driving power, other troubles begin to crop up, one after another, that are never

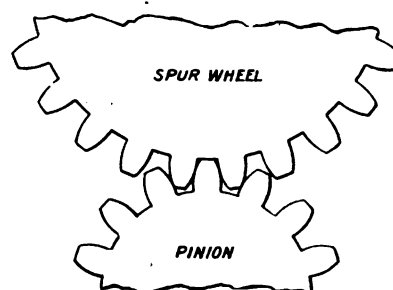


Fig. 1—Spur and pinion wheel with three teeth engaged.

heard of while there is plenty of power. The gearing itself is a nuisance, in the sense that it absorbs far too much power, under the very best conditions, and any arrangement that can be devised that will avoid the necessity of gear wheels, provided that it is equally as effective in the matter of providing facilities for changing speeds, and more efficient in the matter of the transmission of the power from the engine shaft to the driving wheels, will be a boon.

WHY GEAR WHEELS ABSORB POWER.

Perhaps it may be as well to inquire why the gearwheels absorb power, and then to go on to inquire why wear, chipping of the wheels, etc., adds to the power absorbed by them. In the first place, it will be remembered that, leaving out of account for the moment the reversing gear, there are three shafts employed in transmitting the power from the clutch, when it is engaged, to the shaft or wheel leading to the differential gear. Each of these shafts must have supports of some kind, and wherever they are supported, friction will be set up by the surfaces of the shaft and its bearing sliding over each other. This accounts for a fairly large amount of power, under the conditions ruling in motors. But the gearing itself accounts for a great deal more.

It will be remembered that there have to be two transmissions of power, by means of two sets of wheels, through the enmeshed teeth of the wheels. First, the shaft that is connected to the clutch delivers the power received from the clutch directly to the pinion wheel upon it. Next this pinion wheel delivers the power it receives to the spur wheel on

the intermediate shaft with which it is enmeshed, less a charge for delivery. The spur wheel delivers the power received to the axle to which it is attached, and thence to the pinion wheel carried by the axle. Next the pinion wheel on the intermediate shaft delivers the power it receives to the spur wheel on the axle connected to the cardan shaft, or whatever may be employed to pass the power on, less a charge for delivery, and this wheel delivers the power to the axle on which it is carried. At each engagement of the wheels there is friction. The number of teeth that are enmeshed depends upon the ratio of the diameters of the two wheels engaging and upon the pitch of the teeth. As with other methods of reducing or of multiplying speed, the smaller the difference between the two wheels the easier is the transmission and the smaller the friction, because the larger is the number of teeth over which the action is spread.

We can perhaps study the action best if we assume that three teeth are enmeshed, and that the middle tooth of the pinion is right home between the two teeth it is engaging, as shown in Fig. 1. The two teeth on each side then will be, one, just engaging with the opposing tooth of the spur wheel, and, the other, just disengaging. The action of the three teeth, when in this position will be: The tooth of the pinion wheel behind will be sliding forward, on the tooth of the spur wheel it is commencing to engage, and the tooth that is forward will be sliding off the tooth of the spur wheel that it is just leaving. The middle tooth will be pushing the tooth in front of it in the direction in which both are going. The direction of revolution of the pinion and spur wheels is opposite, but the lateral direction in which any two teeth, that are engaged, are moving is the same. Friction will arise on each of the three pairs of surfaces in contact. Just at the moment taken, it will be greatest on the surfaces of the two outer teeth and those they are enmeshed with, but there will be some friction between the middle tooth and the tooth of the spur

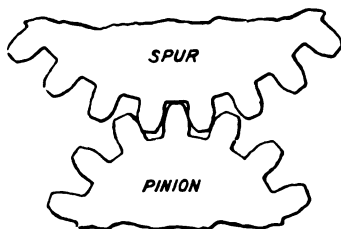


Fig. 2.—Teeth of spur and pinion badly fitted, leading to friction.

wheel it is engaged in pushing forward. These three elements of friction, therefore, account for a good deal of power, the amount depending upon the design of the wheels, the fitting, and the lubrication. The best results are obtained, that is to say, the smallest friction, when the friction is spread over a large number of teeth, when those teeth are very carefully machined, so that the surfaces opposed to each other are enmeshed as smooth as possible and when a film of the proper lubricant, not too thick and not too thin, is always interposed between every two surfaces moving over each other. Anything in the way of bad fitting, teeth inaccurately formed, or left rough, or allowed to become rough by wear or bad usage, immediately runs up the frictional charge.

It need hardly be mentioned that the position chosen for simplicity of explanation of the two wheels only remains for a very short time; with the high speeds ruling with motor engines only for a part of a second. The middle wheel pushes the tooth it is

bearing against onwards, and then engages the next tooth from behind, gradually leaving the first tooth, engaging more and more with the next one, and then gradually leaving it. Meanwhile the tooth that was behind it gradually pushing its way into the space between the two teeth it is enmeshed with, and so on. Friction, it will be seen, arises everywhere, at every step, even where everything is done to reduce it, on the lines mentioned.

WHEN THE TEETH ARE DAMAGED.

And, now, let us consider the question, when the teeth are damaged. First, take the case of badly machined teeth, as shown in Fig. 2. In place of the surfaces of the teeth sliding gently over each other,

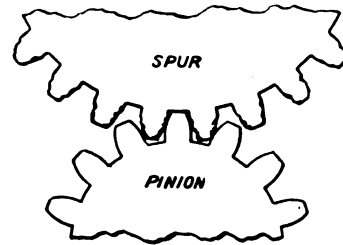


Fig. 3.—Spur and pinion wheels with the spur wheels badly chipped.

gliding, so to speak, they rub over each other much as a brush does, or, say, as rough pumice stone. Everyone knows the difference between rubbing one's hands with smooth pumice stone and with rough. Apply that to two metal surfaces rubbing over each other, but remembering that properly fitted metallic surfaces that are to rub over each other are infinitely smoother than either the hands, even the softest hands, or the smoothest pumice stone, and again remembering that the rubbing of rough metal surfaces over each other creates far more friction, in proportion, than even the roughest pumice stone, rubbing over the roughest hands. It is not difficult to understand how very much the frictional charge increases from bad fitting of the gear wheels, and how it may easily happen that an engine looks to be giving much less power than it is designed for, when it is really more power that is absorbed in the gearing. And this is not the whole story. Where there is bad fitting, there are always inequalities, leading to jerks, which, as every motorist knows, lead to trouble.

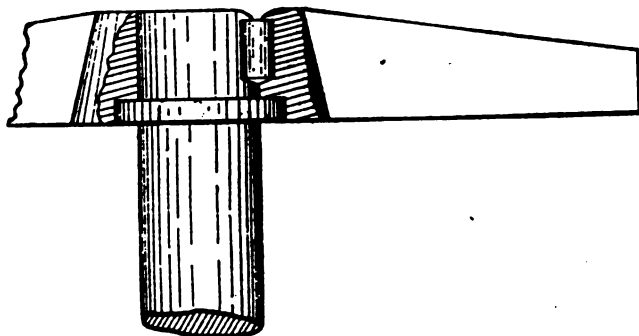
Take, now, the case shown in Fig. 3, where the driver has not been careful in handling his gear, where he has not waited to disengage completely before changing the wheels in mesh, and where he has, in consequence, probably chipped small pieces off the edges of the teeth. Every time a damaged tooth engages with another one, there is a jar, followed by a certain amount of grinding, both giving rise to friction, and leading the way to more friction. Every rough surface, while it tends to wear smooth if it has time, also, in the case of gearing, tends to increase the trouble, because of the jars and jerks to which it gives rise, and because it is not simple sliding. It is sliding plus the actions that have been explained. To sum up, there are two rules: Buy your motor or your gear from makers who fit well and design well, in the fullest sense of the term. Do not believe firms who want to do cheap work, unless there is a very good reason for their cheapness. And, in driving, always have the wheels quite clear before changing. Do not be in a hurry; there is always time, even in the most extreme cases, to be careful.

To locate a knock use a physician's stethoscope.

KEYING A PUMP SHAFT.

An Emergency Repair That Answered the Purpose of Getting Home.

Four of them were touring in a big four-cylinder car. It was in early spring and a sudden cold snap lowered the temperature so much that after housing their car in the barn of a farm house at night, they were particular to ask the one who acted as chauffeur if he had drained off the water from the radiator so there would be no danger of freezing. Yes, he had, sure. But there was one little thing he forgot. There was a petcock in the bottom of the centrifugal pump so that the last drop of water could drip out, and this was forgotten. Just a few thimblefuls of water froze hard in the pump, and



How the pump shaft was keyed.

the smaller the quantity of water the more quickly it will freeze.

In the morning the water radiator was filled and the motor started. Everybody bundled in and a start was made toward home—down hill instead of up to avoid the hard pulling by going around another way. It was perhaps ten minutes later when the driver discovered that the engine was getting abnormally hot, and investigation showed that the water was not circulating. A hurried examination failed to reveal where the trouble lay, so a cautious return was made to the barn. There a more extended diagnosis showed that the pump was not working. Only then the driver remembered that he had neglected the little drain-cock in the pump, and the secret was out.

The question now was how much damage had been done. The pump was taken out and the two halves of the aluminum casing taken apart. At first glance there seemed to be nothing wrong; the vanes on the disk were intact and nothing seemed amiss. Still deeper probing, however, showed that the disk on which the vanes were cast did not rotate with its shaft. When the engine was started with the pump frozen hard and fast, the good tough bronze refused to break, and the steel shaft was too sturdy to let go; but a little screw—technically termed a "Dutchman"—that had been put into a hole drilled half in the shaft and half in the hub of the disk, after the manner of a key, had been crushed and squeezed and mangled until it lost all semblance to its original form, and fell out, leaving the shaft free to rotate uselessly in the hole in the disk. Obviously a new "Dutchman" was needed. So the village blacksmith shop was hunted up; but the blacksmith hadn't any taps or dies of the proper size, and a new screw was out of the question. One of the boys solved the problem, however, and this is how he did it.

He drilled out the hole a little larger than it had been, making it just big enough to take a bit of quarter-inch steel rod with a little driving. The pin was cut off shorter than the depth of the hole and was driven down

until it struck bottom, with its outer end an eighth of an inch below the top of the hole. With the pein of the hammer the metal around the edge of the hole was hammered down until the end of the pin was almost covered. The result was that the pin could not possibly fall out and the disk could not slip off the shaft without forcing out the hammered-in metal. A glance at the sketch will make this clear. The end of the shaft was riveted over slightly to make sure that there would be no looseness, and the pump was put together again. The pump not only ran throughout the rest of the trip, but has run ever since and is doubtless a good deal stronger than it was originally. The very fact that the little screw gave way and no other part did, however, shows that it is well to have a weak link somewhere, so that in case of an abnormal stress the small part will let go and save the more important ones. So this particular pump would be better if put in its original condition. If it froze up now, the starting of the engine would undoubtedly bend or break the shaft or smash the vanes, wrecking the pump entirely.

THE STARTING CRANK.

Why Accidents Occur and How to Avoid Them In Every Case.

According to the records of the accident insurance companies, the most dangerous part of an automobile is the starting crank. More accidents occur while starting the engine than can be laid to any other operation connected with the care and handling of an automobile. Many a man has taken hold of the starting crank with that impression, and picked himself up a moment later with a broken arm, or maybe something more serious.

There is one rule that must be observed in starting a gasoline engine, which is, first retard the spark. This is an easy thing to say, and should be an easy thing to remember, but as a general thing it is forgotten until the engine "kicks."

The object of cranking an engine is to draw a charge into one of the cylinders, to compress it, and finally to

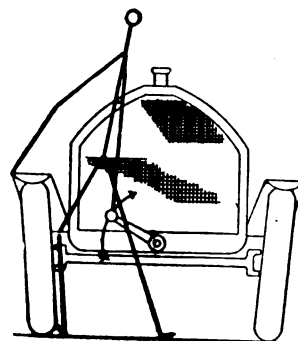


Fig. 1—Lines showing position while cranking with the right hand.

ignite it. The spark should pass when the piston is beginning to move outward on the stroke following the compression stroke, and the explosion starts the engine in operation. With the spark retarded ignition occurs when the piston has reached the end of the compression stroke, or maybe has moved outward a little on the power stroke. Suppose that you are trying to start the engine and have forgotten the rule, so that the spark will occur before the piston gets to the end of the compression stroke. You revolve the starting crank, drawing a charge into the cylinder, and the piston is moving inward on the compression stroke when ignition occurs. Your pull on the starting crank is forcing the piston upward, when the pressure that is developed by the explosion suddenly forces the piston to move downward. This makes the

crankshaft move backward, and you are trying to prevent it by your grip on the starting crank. It all happens so suddenly that you have no time to brace yourself; before you know it the starting crank is torn out of your hand, and in its swing is only too likely to hit your forearm, wrist, or back of the hand, with every possibility of doing you a serious injury.

On most automobiles, as you stand facing the starting crank, it pulls up on your left side. It is natural to grasp it in the right hand, to pull up, and then to press it down with your elbow stiff and the weight of your body bearing on it. This will lead to trouble. If the motor "kicks" while you are pressing down, your stiff arm will be broken. Always pull up; never push down. Pull the crank up to the top, disengage it, turn it backward, and pull up again. The pull should be quick and steady, and you can put force enough into it to send the crank shaft

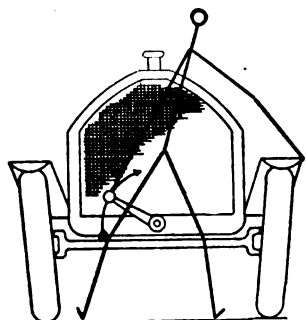


Fig. 2—Cranking with the left hand.

through one or two revolutions at least, the crank disengaging as it gets to the top. You will find it safer and more practical to crank with the left hand instead of the right. It will seem awkward at first, but will be well worth learning. Look at Figs. 1 and 2, which illustrate cranking with the right and left hands, the thin dark lines representing the person cranking. When you use your right hand, you must stand over on one side, and are cramped in against the wheel and the fender. To brace yourself you grasp the fender or radiator with your left hand, and the position is so cramped that you cannot exert your full strength. Worst of all, in case of a "kick" you cannot get out of the way, and as the crank tears out of your hand your arm swings directly in its path. When you crank with your left hand you can stand up squarely to the work, and by grasping the fender or radiator with the right hand can exert the full strength of your arms, shoulders, back and legs. In case you cannot learn to crank in this way, you can at least learn to grasp the crank properly. Do not hook the thumb over the crank handle, for in case of a "kick" that sort of a grip will make it difficult to release the crank. In swinging backward it will catch in your thumb, and give a bad wrench to your wrist and arm. Grasp the handle with an underhand hold.

A Novel Way to Remove Carbon.

There is another method of removing carbon from cylinders which is novel and is said to be effective. The device employed is a common housekeeper's wash-rag, made of a series of wire rings interlocking with one another. The kind preferred is that in which the rings are composed of two coils of wire, one coil overlapping the joint. Another kind, not so good, is that which has no wire overlapping the joint and can, with little effort, be pulled apart.

One of these metallic articles dropped into a cylinder, and the other three cylinders made to run about ten minutes, completely removes the carbon.

GEAR CHANGING.

How to Do It Without Injury to the System.

As a matter of fact, the great majority of comparatively "old hands" change speed execrably, and it is the exception to find a driver who has mastered the art in its full perfection. However, most of the old hands think they are above reproach, so it is practically useless to appeal to them to mend their ways.

It is therefore to the novice that these remarks are principally directed. The beginner, as a rule, regards the gear box as a dreadful mystery. He looks fearfully at its clustering pinions, and decides to leave it alone. He comforts himself with the knowledge that if he pushes a certain lever into a certain notch on a quadrant something (never mind what) happens among those pinions, and a reduction or increase of gear occurs. He may vaguely appreciate the great truth that two cog wheels are disengaged and two others are (with more or less noise) brought into mesh. He may even go so far as to be aware that the amount of noise is in some way proportionate to the different speeds at which the two cog wheels to be engaged are revolving; but there his knowledge stops short.

Now, take for easy illustration, the ordinary Panhard type of sliding gears with two shafts and a quadrant change-speed arrangement. The gate change-speed is coming in, but many cars now on the road are not so fitted, and there are quite enough drivers of cars equipped with the former type to warrant the following remarks. The complications of a direct drive need not be considered, and owners of cars on which the drive on top speed is direct may read these hints as applying, at any rate, to the changes other than those to and from the top speed.

Not everyone knows that a gasoline engine has to be run fast in order to develop its power, and the faster it revolves, within limits, the more powerful it is. Hence in starting and steep hill-climbing the engine must run fast, and a low gear ratio between the engine and the road wheels is necessary, as the engine is not usually sufficiently powerful to drive the car with a high gear up the hill or "off the mark" from rest. Now, before considering the actual changes of gear from first to top, let us get from neutral into the first speed.

It is quite easy; you see it done every day and all day. Just jam the speed lever forward as hard as you can. First speed is sure to go in. Never mind the noise; probably the gear pinions will not break for a week at least. This seems to be the reasoning of the majority of drivers, paid and amateur alike. Now for the right way. Remember that the engine is running free, but not so free that it does not cause the primary shaft in the gear box to revolve. The primary shaft is the shaft which has its outward and visible sign in the male portion of the clutch. It is through this shaft that power is conveyed from the engine into the gear box.

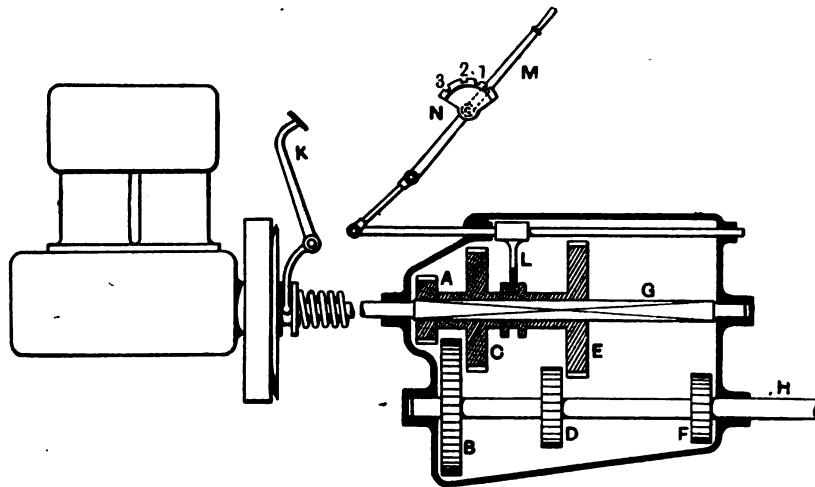
When the speed lever is in the neutral notch, the primary shaft is, as I said, revolving, and with it are revolving the pinions upon it, but none of these pinions are in mesh with the pinions on the secondary shaft, i.e., the "other" shaft in the gear box. Now, to get in first speed, the smallest pinion on the primary shaft must be engaged with the largest on the secondary, and in order to accomplish this one of the two pinions is slid along a squared portion of its shaft until it comes up against the other pinion. It can, of course, only slide right into mesh with this other one when the teeth of the two pinions are in the right position. The small pinion is

revolving and the large pinion is stationary. The speed lever is pushed forward, and a grinding sound is heard. This is caused by the grating of the teeth of the small pinion against those of the large one. The small pinion's teeth are going round so fast that they cannot be forced into the intervals between the teeth of the stationary pinion. Take time.

The clutch has, of course, been withdrawn before any movement of the speed lever was made. Wait. In a few seconds the rotation of the primary shaft will have ceased, because it is now, by the removal of the clutch, disconnected from the engine. When the primary shaft is almost stopped (a little practice will tell how long it takes—it all depends on the weight of the clutch), gently push the speed lever forward. The small pinion teeth come against those of the big one, but this time the small

with their pinions are revolving at about the same speed. A hill is reached, and the pace of the car begins to fall. A reduction to second speed (if on a three-speed car) is necessary. On top speed we have two pinions of equal size in mesh, but in dropping to second we have to engage a smaller one on the primary shaft with a larger one on the secondary. In order to do this quietly, the primary shaft speed must be increased so that the small pinion's teeth shall be travelling at the same speed as those on the larger one with which they are to engage.

As soon as the clutch is taken out, the primary shaft, far from travelling faster, begins to slow down, and the little pinion with it. As a matter of fact, the secondary pinion generally slows down still quicker, because the momentum of the car, owing to the gradient, rapidly dies away, but if we wait until the speed of the car has fallen



Gear Box with cover removed, showing Gears in neutral position.

A, first speed pinion.
B, first speed gear wheel.
C, second speed pinion.
D, second speed gear wheel.

E, third speed pinion.
F, third speed gear wheel.
G, squared portion of driving shaft, carrying A, C and E.
H, driven shaft, carrying B, D and F.

K, clutch pedal.
L, geared striking fork.
M, change speed lever.
N, change speed quadrant.

pinion is only just moving, and the teeth go into mesh sweetly and silently, with an entire absence of shock.

Let us now get going and change up to second speed. Again remember the engine and primary shaft with its pinions are flying round, but the secondary shaft, which is driving the road wheels, is only crawling, for the small pinion goes round a great many times to one revolution of the big one. Second speed is obtained by disengaging the two first speed pinions and engaging two others, that on the primary shaft being larger than before and that on the secondary smaller. The second speed pinion on the primary shaft has been hurrying round at the same speed as the small pinion, while the second speed pinion on the secondary shaft has been dawdling along with the large one. Now, before these two fresh pinions will engage smoothly they must be running at approximately the same speed, just as it was necessary for the small pinion to have almost stopped in getting into first speed.

When the clutch is withdrawn to make the change up to second speed, the primary shaft slows down as before, but this time the secondary is revolving, and continues to do so, because it is being driven from the road wheels by the momentum of the car. Again practice will show how long a wait is necessary before the primary pinion will have slowed down to the speed of the secondary. If the wait is properly judged, the change to second is as quiet as from neutral to first. From second to third the movements in the gear box are the same, and need not be set out at length.

Now come the downward changes, for hill-climbing. Suppose that on top speed the two shafts of the gear box

off to such an extent that the two pinions are revolving at the same pace, we shall find that the engine will not pick up on the lower speed, because it is going too slowly.

We must, then, speed up the primary shaft, and not wait for the slowing down of the secondary. This requires considerable knack and practice. Set the throttle so that when the clutch is released the engine will run free at about the pace at which it would be revolving were the next lower speed in mesh. Release the clutch quickly; move the speed lever out of its notch towards the lower speed, but not so that the lower speed pinions come together. While in this position between the speeds, quickly let in the clutch, and then release it again. This momentary engagement will have speeded up the primary shaft, so that after the second disengagement of the clutch the speed lever can be pulled back into the lower speed notch with no noise of jarring teeth.

This all sounds very complicated, but it only needs half an hour's patient practice to get into any speed at almost any pace. The other downward changes are precisely similar to the one described. My excuse for dealing with my subject in such very elementary terms is that in writing an article for beginners it is as well to aim at being intelligible to them.

Watch the Lamp.

It may be taken as an indication of a leak at some point of the system when an acetylene lamp lights up quickly with a yellowish flame. The light will start up slowly with a clear white flame and make a hissing sound if all is as it should be.

Why It Lost Power.

From G. C. C., Pennsylvania.—I will give you a little experience I have just had which may be of use to others. I have a 1906 Cadillac single cylinder car. It got so it would hardly navigate light grades on slow speed and the power gradually left her. I did everything I could think of to no purpose, and finally thought of running her into a garage for overhauling. As a last resort I examined the carburetor and found the air intake choked with dust and mud dried on. I cleaned this out, gave my buzzer or coil a little more tension, and lo! my car never ran better or had more power than to-day.

A Loose Piston.

From A. W. Gearhart, California.—In answer to your article in the June number on page 140, headed "A Thump in a Cylinder," I have had exactly the same trouble with the same car, and after making all the adjustments you suggest and many more, I found that my trouble was caused by a loose piston. After having the cylinder bored and a new piston fitted, I had no more trouble.

Mules Against Car.

From A. D. H., Florida.—Kindly answer the following: A, the party of the first part, who is a liveryman and is somewhat prejudiced against the auto, and B is the keeper of a garage and uses a Mitchell 30 car for demonstrations. B contends that the car has more power than 4 mules and A offers to wager \$100 that the mules will out-pull the car on a straight pull; that is, to put the mules at the rear of the car, they to have the start backward of a distance of ten feet, then the car is to be placed in forward motion under low speed at a given word.

There has been considerable argument here regarding this proposition and as I am of the opinion that the car will have the best of it I am appealing to you for your opinion. Some think that to put the mules at the rear and have the test as I have described will not be a fair one. Kindly offer some test that you think would be fair. The mules in question are small weighing about eleven hundred pounds each.

(Note by the editor.—The test stated would not be a fair one, and we think the mules would win. Although we do not speak from extended practical experience, it seems quite likely that the mules could start about all they could pull after the start has been made. On the other hand, the car can not begin to start as much as it can easily pull after the start has been well made. Possibly some friendly and experienced reader may be able to suggest a test that would fairly show the comparative pulling power of both mules and car.)

An Auto Trip Through Minnesota.

From A. E. Tompkins, South Dakota.—Thursday, June 10, my wife, two children and myself loaded our outfit into our Rambler touring car at our home near White, S. D., and started on a three weeks' trip through Minnesota to visit friends and relatives at Milaca, Aitkin and other points.

As there had been heavy rains we found the roads very rough and badly rutted, making it hard running with occasionally deep mud holes. About twenty miles west of Marshall, Minn., we came to a small slough with no bridge and of course the car started to go down to China instead of the direction we wanted it to go. Getting out our double block tackle, 125 feet of $\frac{3}{8}$ -inch rope and stake that was a part of our equipment, and Mrs. T. and the children tried to help the car out of the mud, but they were too weak. Fortunately just at that

time a good Samaritan came along with a team and he hitched on and helped us out.

From there to Marshall we found fairly good roads and stopped for the night between that place and Cottonwood (as we were following the Great Northern Railroad to Milaca). At Granite Falls we were told that we could not get through to Wilmar along the G. N. R. R., but to go east to Renville and then north to Wilmar.

From Granite Falls to Renville we found the roads fine but from Renville to Wilmar they were very rough and ruts from three to six inches deep and the soil baked as hard as a brick. That night we spent four miles southwest of Wilmar having covered about ninety miles.

The next day we got a four-hours' run mostly over fine roads when we were caught in a severe rain storm thirty miles west of St. Cloud. The storm lasted until noon Sunday. Early Monday morning we started for St. Cloud through mud and water, which at times was half way up to the axles of the car, necessitating a great deal of slow gear work, and arrived at St. Cloud at about 10.30 o'clock. After a short stop there we pulled out for Milaca, 37 miles distant, and we arrived there at 3.30 p. m.

We stayed there until Saturday morning when we left for Aitkin about 75 miles north, going up on the west side of Mille Lac's Lake. Along the lake there were quite a number of Indians living in birch bark wigwams.

We spent eight days at Aitkin, starting back June 28, following the same route that we did going and found fine roads until we reached Wilmar. We arrived at home Friday afternoon with car in good condition so we went the next day to the celebration at Brookings, S. D., without overhauling the car in the least, not even putting any more air in the tires.

I did not have any tire troubles and did not touch a tire, except to put in a little air three or four times, during the entire trip of 800 miles over the worst possible roads, which I attribute to a full set of Britson Detachable Treads made at Brookings, S. D., which I had put on this spring. Two of the tires under the treads are old ones that I did not consider safe until covered with the treads, and now after running 1,200 miles the treads show scarcely a trace of wear. It made no difference how much water I ran in they did not creep in the least and chains are not needed either in sand or mud, and I am satisfied that they will lessen tire expense at least one-half, besides the satisfaction of the feeling of security against punctures and blow-outs.

A Cleaning Kink.

The brass strip edging to the running footboards and the footplates on the door sills are difficult to clean with a polishing fluid, the latter having a knack of staining the surrounding varnished woodwork or the rubber footboard covering. It is far better to abandon the idea of cleaning them with polishes, and to use the finest emery cloth, a piece that has already seen service on other work and has lost some of its "cut" being best suited to the purpose. New, or unused, emery cloth should never be employed.

Cover for the Magneto.

A magneto of the high tension type with the secondary winding on the armature is very easily put out of commission by a dose of water. In fact, if it becomes very wet it will require some time to thoroughly dry out the insulation. Some makers are now giving especial attention to this point and are providing aluminum covers which are absolutely watertight. The more common leather or fabric covering is effective, but in any case, the magneto should be water tight.

Causes of Various Noises.

Some of the principal causes of timing-gear noises are inaccurate machine work on the crankcase, causing too wide variation in the distance between gear centers; unsuitable crankshaft and camshaft bearings, causing jumping of the shafts when the motor is running; inaccurately spaced and poorly designed gears, causing warping after the strain of cutting the teeth is removed. The utmost care must be taken in fitting up cam gears, and sometimes one or two of the gears may be changed to good advantage, even though they are apparently the same size and shape.

The chief cause of noise in timing gears is the uneven or intermittent load due to the lifting action of the cams, causing intermittent pressure on the teeth and even reverse pressures, producing slumping of the gear teeth, due to backlash. There are a number of points to be taken into consideration in ameliorating this condition, such as reducing the weight of the valve mechanism, proper tension of the valve springs, the use of suitable relatively nonresonant material, shaping cams to give soft action to the valve plungers; proper pitch and lubrication of gears, the amount of permissible backlash.

Noise from pistons, connecting rods and crank shafts has been practically eliminated by good accurate work and bearings, and proper lubrication and clearance between the pistons and cylinders. All pistons and connecting rods must be of equal weight and as light as possible.

The crank-shaft must not be too light; undue side play of connecting rods must be avoided.

The principal cause of valve noise is allowing the valve to slap on its seat. The descent of the valve should be suddenly arrested just before it strikes its seat, either by a slight rise in the cam or by a very gradual taper. The valve spring should be of sufficient strength to keep the roller in contact with the cam. One leading experi-

menter says that in proper design the sound produced by the seating of the valve cannot be heard outside the motor with the manifolds, carburetor and muffler connected. The weight of a valve necessary to give the best result is a matter for mature consideration. The thickness of wall and shape of the manifold are also important.

Starting on the Spark.

A 6-cylinder car with a four-cycle engine naturally starts on the spark more readily than a 4-cylinder car. When the 6-cylinder motor stops there is always one of six pistons past the center and in the position of just starting on the explosion stroke and ready to do the work of starting the motor if the gas be ignited by the spark. The following piston is in the same effective position in one-third of a revolution of crank-shaft and before the effective pressure due to explosion on first piston has ceased. Consequently in a 6-cylinder motor there is always one piston pushing, thereby avoiding any lull and occasioning continuous torque, which is very desirable. A 4-cylinder motor can stop without any piston hung in an effective position, and in this condition the motor cannot be made to start on spark, and also as the piston following is one-half revolution behind instead of one-third, there is a time in each revolution when there is no piston pushing, so there is a lull in each revolution and there is no continuous torque. Ordinarily gas motors do not start on compression; compression means pressure on head of piston, which would force it through part of its stroke when motor is idle, and there is no resistance until pressure nearly ceases, and there would exist practically no compression.

The time saved with an automobile to a busy man is a great factor, and the pleasure which one has in using a good machine cannot be measured.

DAVIS TIRE ARMOR.—This armor will protect your tires and save you money. Write for booklet, giving full particulars, to Davis Robe Co., 1306 Champlain Building, Chicago, Ill.

"SAVE HALF YOUR CIGAR MONEY."—This phrase heads the prominent advertisement in this issue of John B. Rogers & Co., 260 Wall St., Binghamton, N. Y. We are acquainted with this company, having done business with them in various ways for a number of years, and know that they make good cigars, and that our readers will make no mistake in dealing with them. If you can get, by the box, a cigar at 5 cents which retails either at 10 cents each or three for a quarter, there is, of course, a distinct saving. The "El Provost" mentioned in the advertisement, the editor of this journal has smoked for a good while. Send for their catalog, entitled "Rolled Reveries." Their statement that you can save 50 per cent. by dealing with them is not extravagant.

HORSE SHOE TIRES.—The Beebe-Elliott Co., 103 Beebe St., Racine, Wis., have a new announcement in this issue, which should interest many readers. They say their tires will not puncture or skid when used as directed. This tire would seem to be especially desirable on autos used by physicians. Send for booklet, giving full particulars.

THE REBUILDING OF AUTOS.—The removal of the Auto Rebuilding Company from 1349 Michigan Ave. to 1307-09 Wabash Ave., calls attention to the remarkable showing of a Chicago man in the widely growing field of rebuilding autos and supplying the trade with surrey seats and baby

tonneaus for all makes of roadsters and runabout machines. The new quarters of the Auto Rebuilding Company consist of over 25,000 square feet of floor space for the requirements of their rapidly growing business. The first floor is for machine work, general rebuilding and repairing. The second floor is devoted to the making of auto sheet metal parts, body making, upholstery, woodworking, and blacksmithing.

Their efforts are by no means confined to garage work in the ordinary sense of the word, for they are engaged in the manufacture of rumble seats and baby tonneaus for dealers and repairmen in every corner of the country. Their output is very large and is of such a dependable and satisfactory character that wherever their product goes, it creates for them a life-long friendship and patronage. Mr. Pursell is simply demonstrating in the automobile field that little quotation of Emerson's, to the effect that if a man can write a better book, build a better house, or make a better mouse trap than his neighbor, the world will make a beaten track to his doorway. The growth of the Auto Rebuilding Company has been due to nothing less than the production of meritorious articles. Mr. Pursell believes in giving his customers just a little bit better quality for their money than they expect.

Dealers who are in need of special bodies or seats should not fail to communicate with this live, progressive and dependable concern. They are successful, but their methods are deserving of still greater success.

HOYT TRIUNE POCKET VOLT-AMMETER.—This little instrument is an exceedingly

practical device. It is offered to motorists for coil testing. It consists of a coil of wire, wound on an aluminum frame, and pivoted within the poles of a powerful magnet. Passing a current through this coil causes it to rotate, the deflection being in exact proportion to the strength of the current, regardless of whether vibrations are fast or slow. Some of the advantages of this type of instrument over the common iron type are as follows: It is accurate in all parts of the scale, sensitive to very small currents, no current lost on account of the instrument, no induction errors, is accurate at all motor speeds and will read accurately on vibrating currents. The instrument is contained in a plush lined morocco case with a separate compartment for a pair of silk cables, which are furnished with each instrument. It will be appreciated by the trade as a safeguard against annoying ignition troubles. Write for particulars to the Hoyt Electrical Instrument Works, Penacook, N. H., not forgetting to mention the AUTOMOBILE DEALER AND REPAIRER.

CHANGE OF NAME.—Our readers should bear in mind that the name of the Trenton Rubber Mfg. Company of Trenton, N. J., has been changed to the Thermoid Rubber Co. There were several reasons for the change, the principal one being that this company has been making what they call "Thermoid Brake Lining" for many years and have established a high reputation for it. The company has always been careful to claim no more for their goods than the merits of the goods demanded, and, as a result, people everywhere have confidence in what they say and in the articles which they make.

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Photo.
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This is not done by any mysterious process. You accomplish it merely by purchasing your cigars of us, the manufacturers, knowing that we sell you the same values at a price that represents the retailer's price **less** his profits and expenses; the jobber's profits and expenses, and the expenses of their salesmen.

It is simply that we choose you as a customer rather than the wholesaler, who buys in big quantities, and give you the same price. We have proven that enough consumer customers more than equal the jobber trade we abandoned.

Thus, you buy just as cheaply as the jobber, who thru his salesman, sells the retailer.

Your own calculation will show that if we can carry this out, in good faith, you easily

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There are many thousands of kinds of good cigars made. We will not claim ours to be any better than the best. We do claim, however, that in value they are just the same and equal to those sold by the retailer at twice our price, not because they are so much better cigars, but because of the saving made by our change of customers. There is no extraordinary claim in our statement that by doing business **directly** with us you

SAVE HALF YOUR SMOKING EXPENSE.

Thousands upon thousands of the most critical discriminating smokers do business with us and buy all of their smokes of us, year in and year out, and, while we make many friends, we think

it is safe to assume that they buy much more from the business standpoint than they do for friendship.

Our object is to please you, and our line is so great that we are sure to do it. We do not attempt to force upon you any one cigar. We prepay all **transportation** charges, and whenever you are not satisfied, we pay the return charges on any cigars and charge you nothing for those you have smoked to find they did not suit you, but immediately make a refund of your money, or exchange cigars if you wish.

Just to get started, and as an illustration of our element of saving, we suggest our **EL PROVOST**, a $4\frac{1}{2}$ inch Perfecto at \$6.00 per hundred, which will show you immediately that you have paid 10 and 12 $\frac{1}{2}$ cents each for many brands of cigars not equal to the **EL PROVOST**.

In any case, let us send you our catalog—**ROLLED REVERIES**—which shows all of our brands, ranging from two to fifteen cents each—all upon the basis of jobbers' prices, and in every detail tells you all about it.



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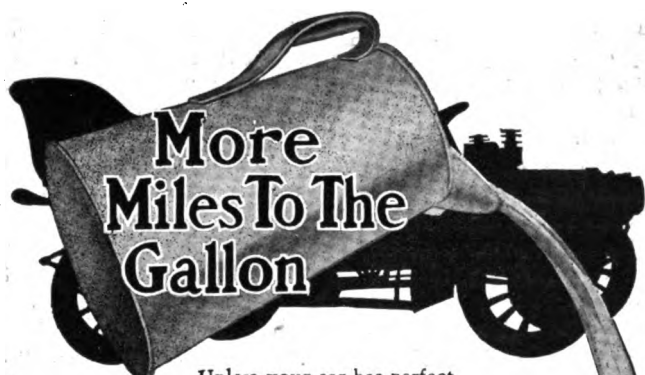
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The best way to go about the removal of the broken portion is to drill in the center of the part broken. This hole should be of a certain size depending on the diameter of the stud. For a $\frac{3}{8}$ -inch stud a bare $\frac{1}{4}$ -inch diameter hole should be drilled, care being taken to drill right down the center of the stud so as not to damage the thread. A flat nosed drill should be used, and should be ground so that it only cuts when rotated in the left-hand direction, and not in the right, as the usual drill is ground. The reason for this is that if the stud thread be at all slack rotation of the drill and the cutting action will tend to screw out the stud, which will very often come out readily before the hole is drilled very far.

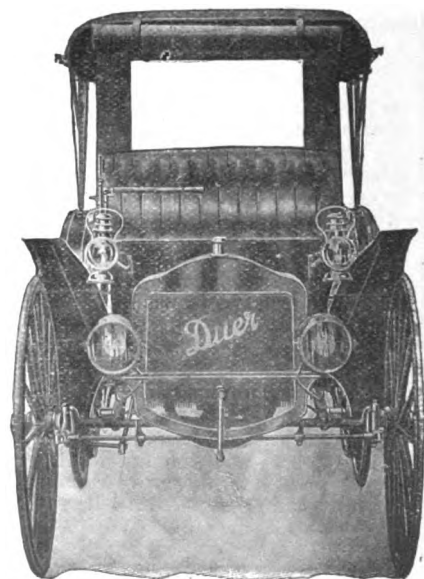
If the stud does not come out as described, then, after the hole is drilled through it, a square reamer is lightly driven into the hole. A lathe carrier is fixed to the top of the reamer and the stud twisted out by rotating the carrier anti-clockwise. If the drilled part is very fast and then will not readily come out, the only thing to do is to chip the broken part with a sharp round-nosed chisel. This usually has the effect of cracking the skeleton of the stud, and the pieces can be fished out of the hole with a piece of bent wire.

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\$1.75 each for full elliptic springs. 5 leaf.
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\$0.80—All sizes clincher rims, also Dunlop.
\$0.30 each for 9-in. head lamp brackets.

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List and description of these and other parts on request. I. L. Breakstone, 1712 Michigan Ave., Chicago, Ill.

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Size.	Case.	Tube.	Size.	Case.	Tube.
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Guaranteed Clincher cases and tubes, a small lot to close them out; 28x3 case \$10.50, tube \$2.75; 30x3 case \$12, 30x3 1/2 \$15, tube \$3.50. Single-tube tires 5 and 8 lugs, 28x 2 1/2, \$10.00; 28x3, \$12.00. Single-tube tire seconds, \$2 less each. I ship C. O. D. Pay for tires after examination. Get your order in before the advance in prices. Wm. Vanderpool, Springfield, Ohio.

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WANTED—To exchange 240 acres of land adjoining the city of Pine Bluff, Ark., suitable for residence lots. Will take good second-hand automobile in trade. Price of land \$75.00 per acre. References, Citizens' Bank, Bank of Pine Bluff, Merchants & Planters' Bank of this city. Apply to F. G. Smart, Pine Bluff, Arkansas.

SPECIAL BARGAINS—4 cyl. 20 H. P. motor \$170. 2 cyl. opposed air-cooled motor \$45. 2 cyl. 10 H. P. motor, air-cooled, new, \$60. 2 cyl. upright motor, air-cooled, new, \$80. Brass hood radiators, \$21.00. 2 cyl. 2-cycle \$50. Planetary transmissions, 10 H. P. \$18; 15 H. P. \$23; 20 H. P. \$25. Fenders \$8.00 per set. Shaft drive axles \$80.00 a pair. 5 passenger bodies in white \$30.00. 1-5 passenger body, upholstered, shop worn \$60.00. 2-7 passenger bodies, Ford, second-hand \$40.00. Search lights with mirror lens \$7.00 pair. 436 28x3 Art wheels, wood painted \$12.00 per set; 49 30x3 \$14.00 per set, 30x3 1/2 \$15.00; 32x3 1/2 \$18.00. Runabout seats, upholstered, \$23. Rack and pinion steering gears complete, \$8.00. Steering wheels \$2.25. 52 tooth sprockets 1x3/4x 9-16 \$2.50. Gray & Davis oil lamps \$5.00 pair. Graphite 1-lb. can 30c, 5-lb. can \$1.25. Crouse Hinds timer, 4-cyl. \$2.50. Spark and throttle control \$1.50. 70 32x4 wheels, per set, \$18.00. 67 34x3 1/2, \$18.00 per set. 66 34x4 wheels, \$18.00 per set; all of the above are new with hubs and clincher or Q. D. rims. Haytt roller bearings for 1-inch shaft, each 75c. Solid square axles, per pair \$22.00. One pair of solid square truck axles with hubs, pair, \$30.00. Press steel dashes \$4.00. Mahogany dashes, each, \$2.00. Steel hoods, each, \$4.00. Friction rims, 1 1/2 x 1 1/2, each, \$2.00. 2 Aurora delivery bodies, each, \$30.00. Complete set of parts for the Aurora car for \$400. 4-cyl. opposed water-cooled, complete, \$100. 7x7 opposed, water-cooled engine, \$200. 2-cyl. steam engine, \$25.00. Springs nearly all sizes, \$1.50 to \$6.00. M. & M. Motor Cycle, magneto, horn and gen., \$165.00. Auto Parts Co., 52 West Jackson Boulevard, Chicago, Ill.

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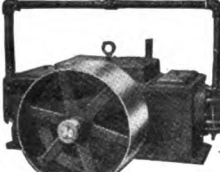
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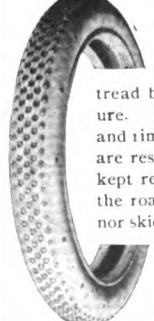
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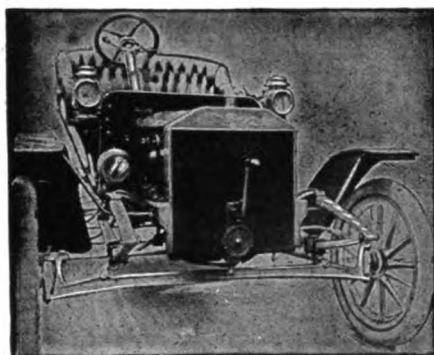
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Patented
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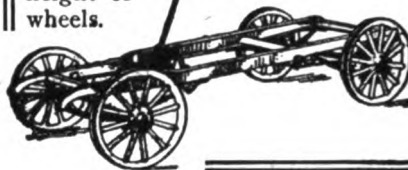


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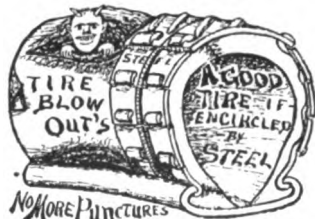
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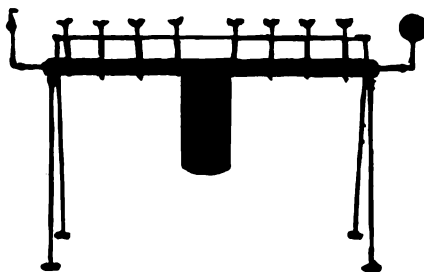
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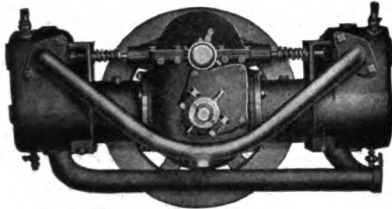
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Not one drop of Gasoline wasted.

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THE
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Positively Makes



TIRES
60 to 70%
STRONGER
and Practically
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Makes Tires Last Twice as Long

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THREE TIMES THE LIFE.

A NECESSITY FOR EVERY AUTO OWNER.

FREE Send for our Booklet "TIRE TROUBLES," with description of Vulcanizer, to-day.

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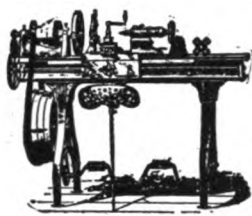
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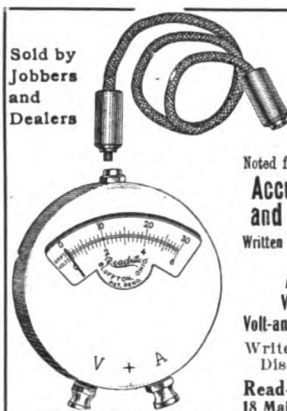
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Friction Transmission, Chain Drive to each Rear Wheel.

Transo-Differential Gear, a new "fool-proof" device, and the most simple and durable yet invented for the purpose.

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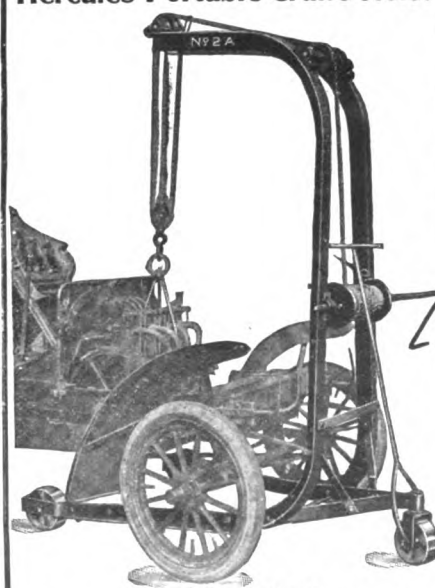
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\$25,000.00

**Great Purchase of Clinchers, Uni-
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1905 Dunlops and Tubes.**

We guarantee to save you 50% off the regular prices. They are all guaranteed 1909 stock.

Let us know the size and style used and we will quote you a price. This is a great opportunity to save considerable money. We have all sizes on hand in the Bailey, Midgley and Plain Treads, also all styles of tubes.

50% to 70% Off 1908

TIRES AND INNERTUBES

Biggest cut ever made on first class, fresh stock. All strictly first quality, fully guaranteed 1908 product of the most prominent manufacturers.

We absolutely guarantee them worth double the price asked for them. The extraordinary low figures at which we are selling them will move our limited stock quickly, and we would advise you to mail your order now. **DO NOT DELAY.**

Casings and tubes to fit any Clincher or Universal Rim.

Size	CASING.		TUBES.	
	Reg. Pr.	Our Pr.	Reg. Pr.	Our Pr.
28x2+	\$12.50	\$7.00	\$3.20	\$2.50
28x3	14.65	10.50	3.65	2.75
28x3+	21.85	12.00	5.00	3.50
30x3+	23.15	15.00	5.80	3.50
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30x3+	18.25	8.50	3.85	2.75
30x4	31.80	17.50	6.40	4.75
31x4	33.50	18.00	6.65	4.50
32x3	16.80	10.50	4.15	3.25
32x3+	24.60	15.00	5.50	3.50
32x4	33.65	18.00	6.85	5.00
33x4	34.85	19.00	7.00	5.00
34x3	17.90	9.25	4.45	3.50
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36x3+	29.05	12.00	6.25	4.25
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New York.

SAVE YOUR CAR

BY ATTACHING OUR

Supplementary Spiral Spring

OVER 15,000 IN USE



Send for "MISSOURI PROOF"—we show you—and our 1908 BOOKLET—it's interesting.

Beware of worthless makeshift single or double coil imitations and infringements.

Liberal NO RISK propositions to the trade.

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"They are everything you claim for them."

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"I cannot understand how I did without them."

LEOPOLD KAHN, New York City.

"Make the car ride very comfortably."

S. N. BRIGGS, Los Angeles, Cal.

The above extracts from a select few letters recently received give an idea of the range of territory in which the Supplementary Spiral Springs are popular. We have too many to print.

ST. LOUIS SUPPLEMENTARY SPIRAL SPRING CO., Inc.

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ST. LOUIS, MO.

NEW YORK OFFICE, Motor Mart Bldg., 1876 B'way, Room 202.

BOSTON, 889 Boylston.

CHICAGO, 1218 Michigan.

PACIFIC COAST, 424-446 Stanyan Street, San Francisco.



Friction Transmission Chain-in-Oil Driven.

The Cartercar is in a class of its own for simplicity. It has but few parts.

The annoying features of other cars are eliminated with the Cartercar patented Friction Transmission and patented Chain-in-Oil Drive.

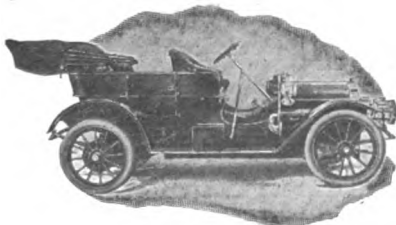
There is no clutch—no gears—no water pump—no fan—no universal joints—no shaft drive—no bevel gears—no

grease packings—no noise—and only one control lever.

The Cartercar will climb a 50% grade with five passengers.

A boy can drive and care for it as well as a man.

Write, if you are interested, to Pontiac, Mich.



\$1,350.

\$1,350.

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A JOURNAL OF PRACTICAL MOTORING
REGISTERED IN U. S. PATENT OFFICE.

Vol. 8, No. 1.

NEW YORK, SEPTEMBER, 1909. 426588

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Size	Reg. Price	Our Price	Reg. Price	Our Price		Size	Reg. Price	Our Price	Reg. Price	Our Price	
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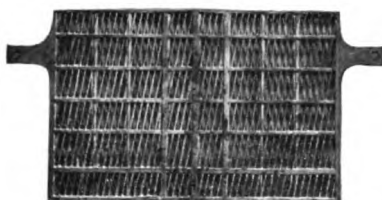
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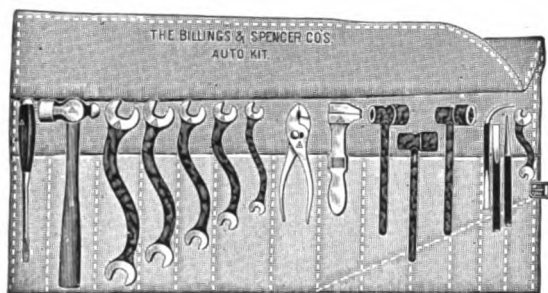
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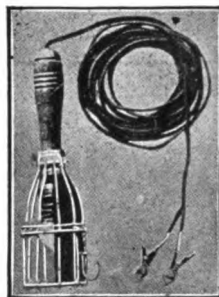


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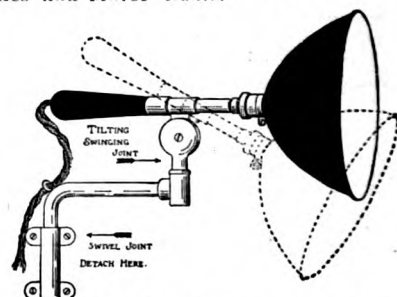
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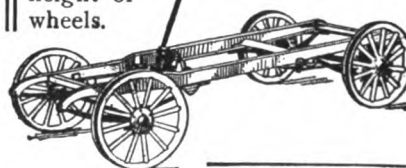
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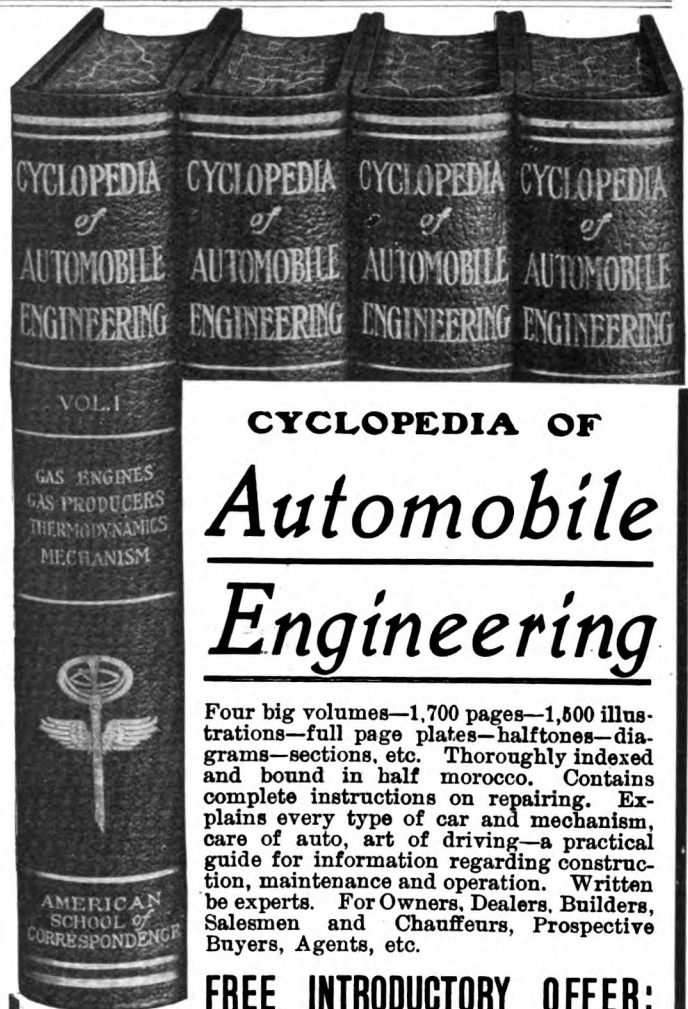
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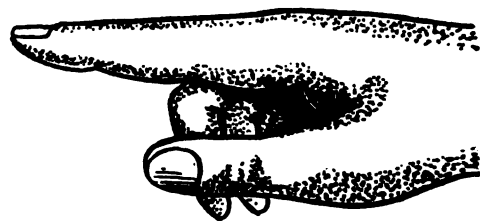
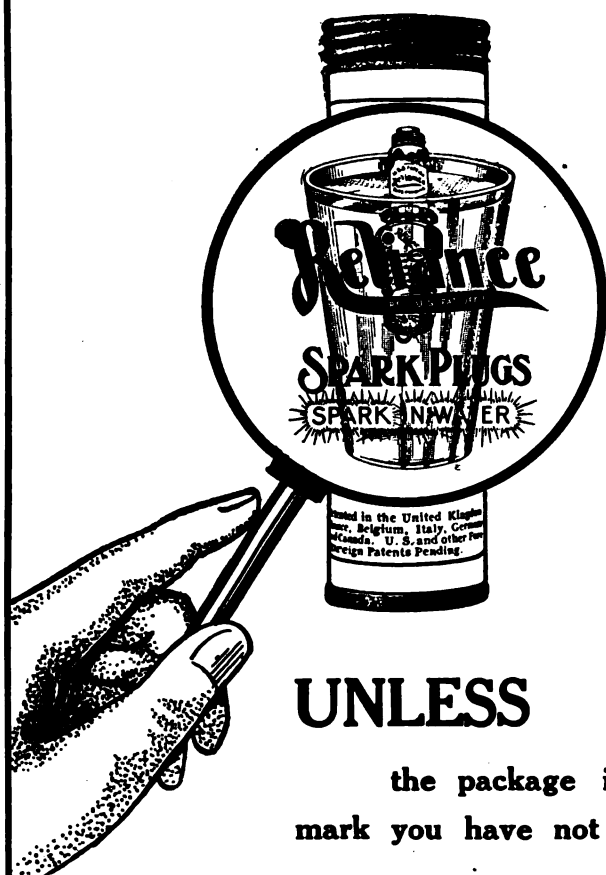
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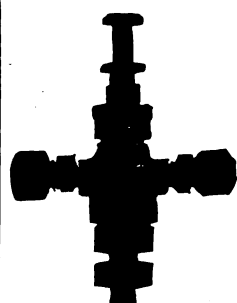
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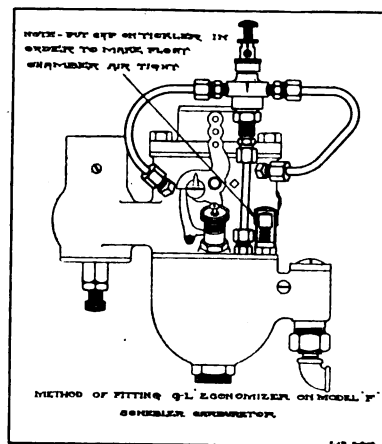
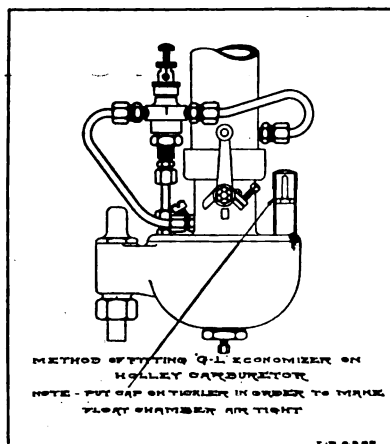
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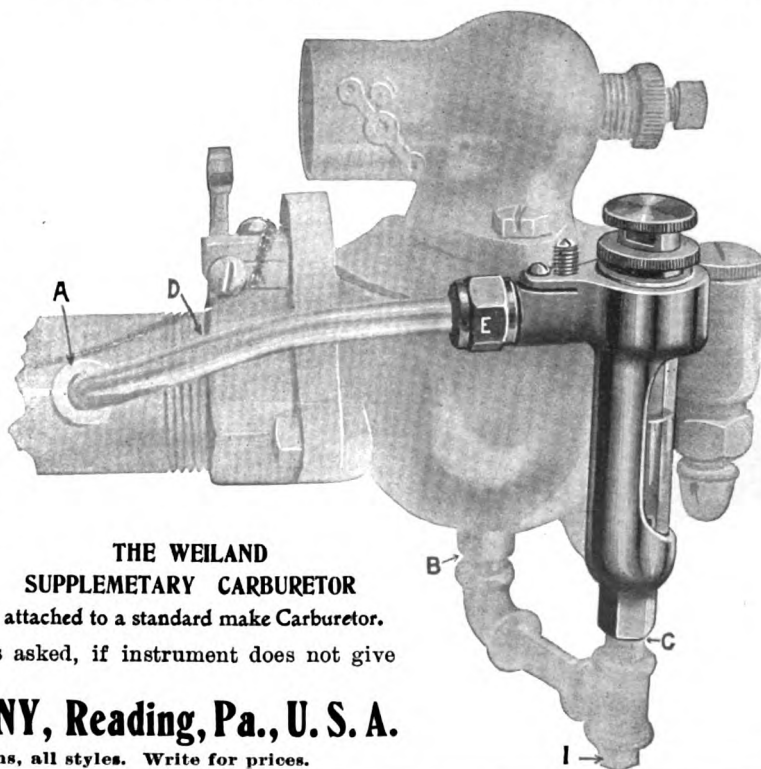
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CAR DRIVING.

The Right Way and Wrong Way to Sit and Use the Arms.

The mere matter of driving a motor car in the sense of getting it to a given point and back again without an accident is a comparatively easy and simple accomplishment, even to a beginner after a little prac-

stiff to operate, such a method is not only unnecessary but a distinct disadvantage, for it tends to encourage undue roughness and force in changing, and thereby the teeth of the gears suffer. Why not hold the lever, for a forward movement—or for forward and across the gate—as shown in Fig. 2? This method gives all the grip and certainty of movement that is

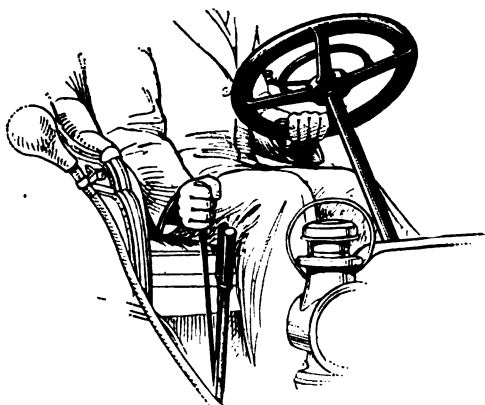


Fig. 1—A fierce grip on the change speed lever and a bad method.

tice, but, as in many of the details of golf—the grip, the swing, the stance, etc.—there is a right and a wrong way, an easy and an awkward way, and sometimes a safe and a dangerous way of carrying out a number of the necessary operations. In order to exemplify the alternative methods in a few of these operations, I have "posed" before an artist, and the



Fig. 3—The finish of the forward movement, or ready for a backward pull.

required, and there is no implied necessity for great force as with Fig. 1.

Fig. 3 can be taken to represent either the finish of the forward movement when the lever is held as shown in Fig. 2, or the "grip" before commencing a rearward movement. In the former case the action of

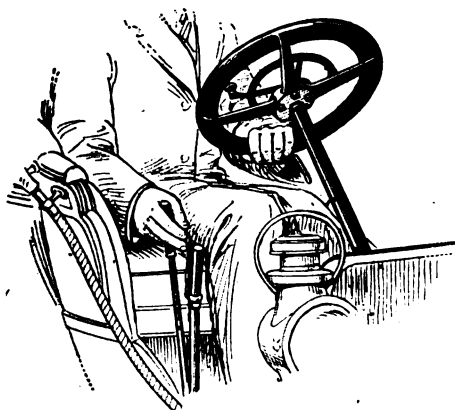


Fig. 2—The correct hold for a forward movement.

results of our united efforts are shown in the accompanying sketches taken from these poses.

Take Fig. 1. Notice the "fierceness" with which the gear lever is being gripped preparatory to making a change. This, to my mind, is a fault, and one from which a great number of drivers suffer, for unless there is some defect in the mechanism actuated by the movement of the lever, making the latter excessively

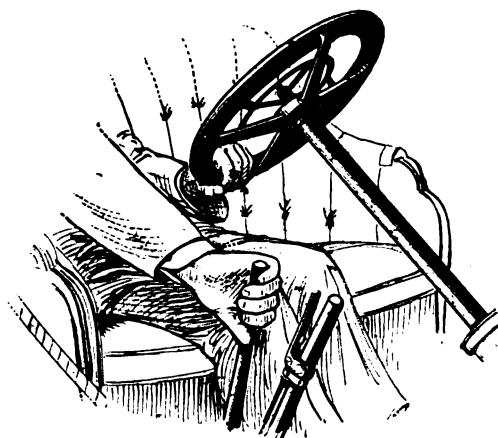


Fig. 4—An alternative grip particularly suitable for some gears.

"changing" has been an easy natural operation; no movement of the wrist has been required, the V formed between the thumb and first finger merely turning slightly round the top of the lever.

But imagine this same photograph to represent the grip for a rearward movement; no more force is required than can be transmitted by the two fingers as shown. By holding the lever with the two fingers

thus, firmly, of course, the action to revert to the position of Fig. 2 is far more easy and natural than if the fierce grip shown in Fig. 1 be again used.

Illustration Fig. 4 shows an alternate method of holding the lever for a movement back and outwardly across the gate. I have found some advantage accrue from this method when the sliding shaft of the lever is liable to bind in crossing the gate. A number of

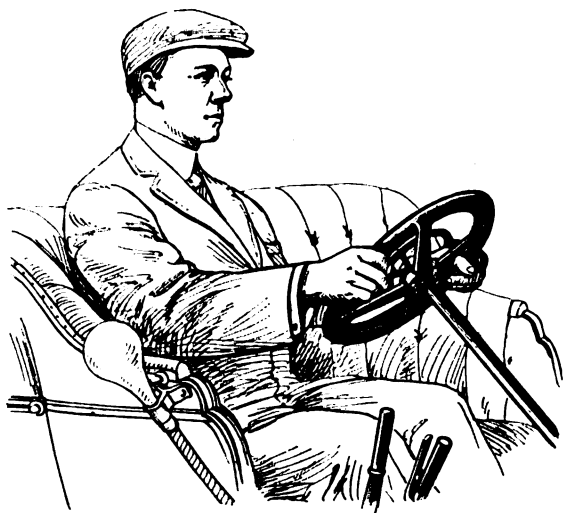


Fig. 5—An awkward hold of the wheel.

cars are far from perfect in this respect, and the benefit of this grip is due to the fact that the natural pressure of the wrist and arm is then directed outwardly. I have noticed that the tendency to bind in crossing the gate is more often felt to a greater extent in passing from the inner side to the outer, and in such cases I can recommend this method of holding the lever.

Figs. 5 and 6 show two ways of holding the steering



Fig. 6—A better hold on the wheel and a more comfortable position.

wheel, and—apart from the position shown in Fig. 6, looking and feeling to my way of thinking, far more natural and comfortable—it has the advantage—demonstrated in Fig. 3—that in reaching to the gear lever, when the latter is in its most forward position, there is no tendency for the movement of the body to

cause a pressure of the hand on the wheel which might turn the latter at all.

In making the change of gear mentioned with the wheel held as in Fig. 5, there is undoubtedly some liability that an unintentional movement of the wheel will be made away from the body on the left side. This especially applies in the novitiate stages of driving, when the required restraint to prevent any movement of the wheel in changing is often overlooked during the operation.

Personally, too, I find that with the left hand held

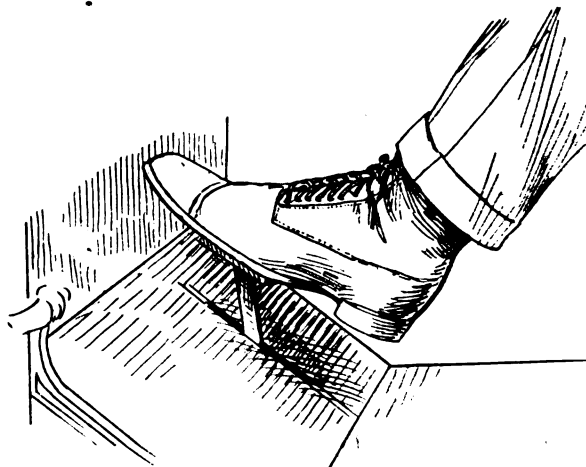


Fig. 7—Wrong foot position.

at the bottom or in the center of the wheel, as shown in Fig. 6, steering is accomplished to a nicer degree of accuracy and precision in making small deviations from the straight line, and simply by a small movement of the wrist, which is all that is then necessary.

The position of the feet as shown in Fig. 7 is not to be recommended when the clutch is "in" and the brake "off." The heels, if not the whole of the foot, should be kept firmly on the floorboard, for, by resting the weight of the foot on the clutch pedal as shown, a large amount of unnecessary friction and wear takes place at the clutch fork. Not only so, but by reason of the pressure thus exerted against the clutch spring,

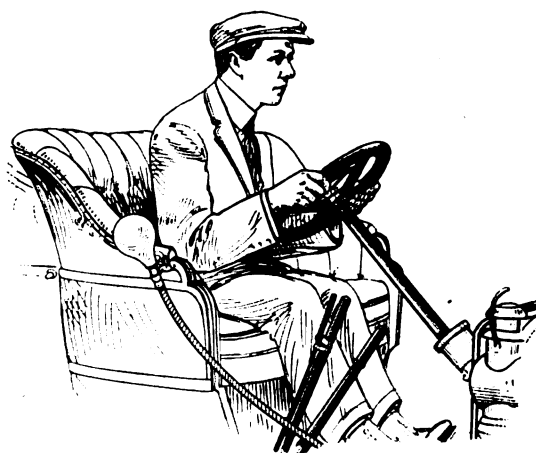


Fig. 8—Nervous and uncomfortable position.

there is a decided liability that, unless the power of the latter is considerably in excess of what is necessary, the clutch may sooner or later commence to slip. I may say on this point that I have more than once noticed when riding as a passenger on a car in traffic or through a town that the driver—not a man of very lengthy experience, perhaps, but then these remarks are not particularly addressed to "old stagers"—has unconsciously caused the clutch to slip for con-

siderable periods, merely by exerting a very slight pressure on the pedal, quite unintentionally, in addition to the weight of the foot and leg.

Figs. 8, 9 and 10 almost speak for themselves, and

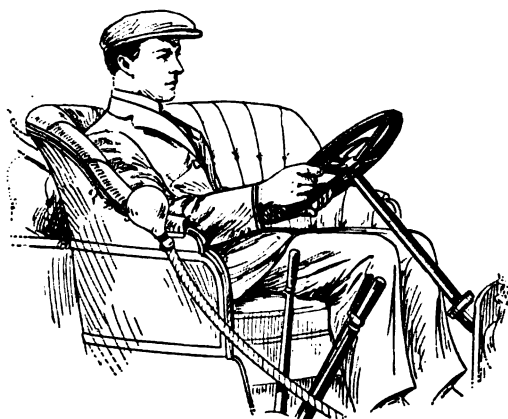


Fig. 9—The lounging and inelegant posture.

my only object in reproducing them is to decry the extreme positions or "seats" shown in 8 and 9. The awkward, apparently nervous, and uncomfortable seat of the former is frequently adopted by beginners. There is no additional safety, or precision in the vari-

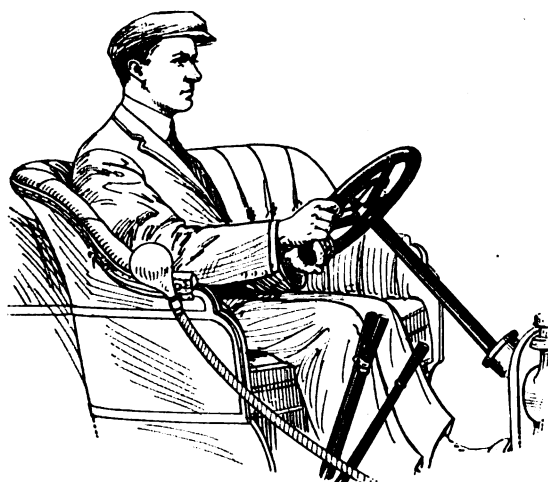


Fig. 10—An easy and comfortable seat ready for all emergencies.

ous operations to be obtained by leaning forward in this way—in fact, the "easy seat" as shown in Fig. 10 decidedly adds to certainty of correct manipulation.

A Polishing Mixture.

A good mixture for the preservation of the appearance of the body of a car is a gallon of boiled oil, a half pint of gasoline and one-half ounce of Japan dryer, the whole well mixed. This should be applied with a soft rag or cheese cloth and should be used sparingly, the varnished surface being washed perfectly dry.

For the Valve Seats.

To polish the seat of a valve without much delay, take a large cork, the size of the valve, and trim it to fit the bevel of the seat with a sharp knife. Fasten it to a common file handle with a wood screw and include under the screw a strip of fine emery cloth so that the emery side will apply to the valve seat. Turn by hand until smooth, then wash out the chamber with gasoline to get rid of all loose emery.

LOSS OF POWER.

It May Often Be Due to Compression, Mixture, Ignition or Cooling.

A worry that occasionally occurs with all cars, especially if they be old ones, is loss of power. As in medical matters, so in automobile maladies, the cause is best arrived at by a process of exclusion, and the investigation can be carried out under four main lines: Compression, mixture, ignition and cooling.

With engine on full compression, pull starting handle round, and if the compression be defective, it will at once be detected. If so, examine inlet and exhaust valves; if pitted, grind them in, and see that stems and tappets have sufficient clearance. If the valves be healthy and the combustion head not cast solid with the cylinder, see if that point be gastight. Placing a little soap and water or oil round the joint and running the engine will by the presence of bubbles show whether the fault be there, and if so the joint must be made tight. If the piston rings be worn or the cylinder has become oval, new rings may be needed or the cylinder may require lapping. The latter work had better be given out.

Too rich or too poor a mixture may cause loss of power. Examine carburetor, and see that the needle valve closes, that the gauzes at the air intake and where the gasoline pipe enters the float chamber are not blocked, and that the jet is clear. If these parts are all right, the fault may still be to a certain extent due to the mixture, or rather to the want of it. In engines with automatic inlet valves, the spring may be too stiff, and thus the valve will only open late, and so a not sufficient charge be admitted. Slack back the spring or cut off a coil of it.

A poor spark may cause a poor explosion, and so loss of power. Examine accumulators to see that they give at least four volts. See that all the electric contacts are good, especially at the commutator; also that the platinum points of the coil trembler or at the commutator in a make and break type are neither pitted nor sooted; if they be, dress them with a file, and in the former case adjust so that the tumbler gives a good buzz. In case of magneto ignition, see that the platinum points and sparking plugs are clean.

Imperfect water circulation, by allowing overheating, is often the cause. See that the pump works and delivers, that the pipes are free, that there is no air lock, and that the cylinder jacket is not furred up. Using only distilled water will obviate the last named trouble. In friction driven pumps see that the friction wheel presses against the flywheel, and that it has not slipped off the feather which keys it to the spindle.

Let the Dust Settle.

Perhaps one of the most trying experiences encountered in a day's motoring is that attached to driving through a cloud of dust raised by a car passing at speed. One never knows what is behind, or in the dense pall, and he is indeed a wise man who slows up, and even stops his car, well in on the right-hand side of the road until the dust has subsided.

Economy of Coasting.

Coasting is an art, and a very useful one to learn and habitually practice on all possible occasions. It is especially economical on undulating roads, and it is really astonishing how the fuel allowance can be reduced on the same stretch of mileage by a judicious use of the law of gravity.

A HOSE AND A KEG.

There is Some Soul of Goodness in Things Evil as Well as in Things Good.

From Dr. I. L. Ritter, Maryland.—“If you will get me a beer keg and a piece of hose I can run the car to town,” exclaimed the owner of the broken Ford.

For some moments they regarded him with uneasy attention.

“Empty or full?” asked the owner of the Maxwell.

“Empty, of course,” came the reply.

“Now I know he’s crazy,” interrupted the owner of the Crawford car, and he moved a few paces away.

The occasion of these remarks was a broken machine which stood by the road-side—a sorry spectacle, indeed. On rounding a sharp curve in the road, it had dashed into the rear end of the Crawford car,

tions, and at normal speed. The only inconvenience was caused by the water in the keg becoming heated, and steam blowing out the bung hole. This discomfort was obviated by inserting a piece of hose and turning the steam to one side. As a “proof of the pudding,” here is a cut of the car.

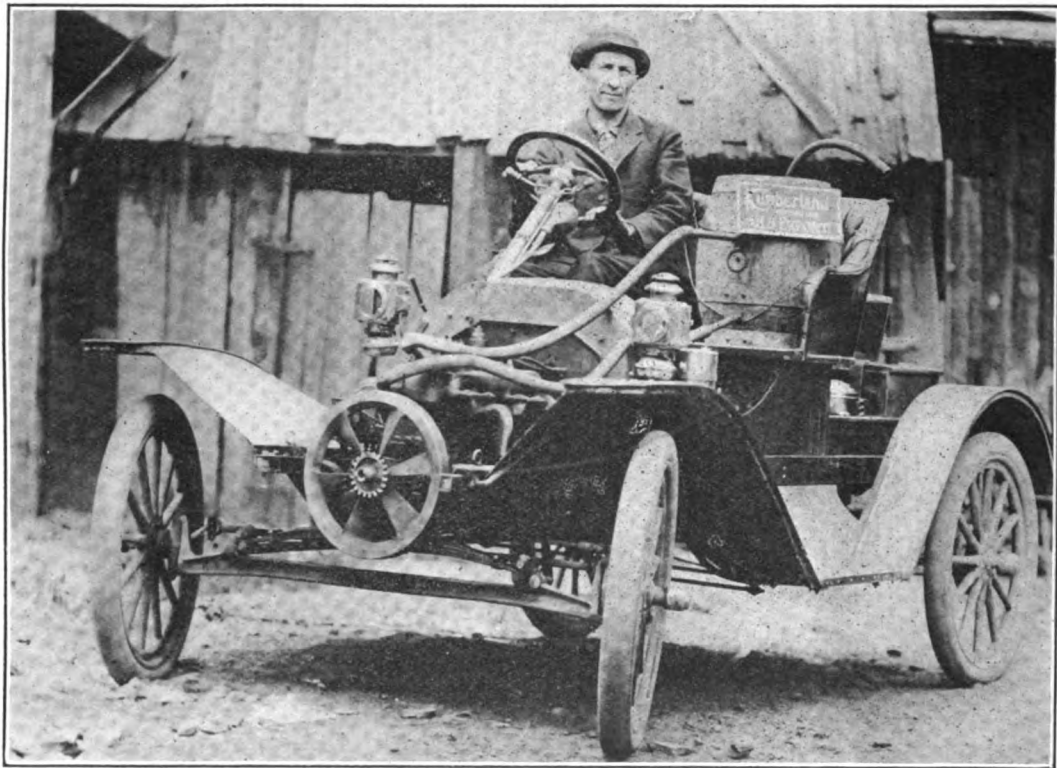
To record the comments which this reconstructed automobile occasioned, as it passed through small villages on its homeward trip, would be out of place here, for—

This little account is intended to show

He who knows a machine can make it go.

Rim Cutting.

The cutting of tires by the rims is generally caused either by overloading or lack of sufficient inflation.



Good Use for a Beer Keg

smashing its own radiator, and breaking its crank. The muffler exploded.

The accident occurred in a desolate region of West Virginia, and there was no town near where repairs could be made. Out of sheer good humor, they got him the hose and the keg (no easy matter in a local option county) and awaited results.

The owner of the wrecked machine gazed vacantly into space for a few moments, as if about to fulfill earlier expectations, then set systematically to work. He put the keg on the front seat, bored two holes in it, and drove iron pipes into the holes. The rubber hose he slipped over the pipes, and attached the other ends to the water-jacket. The keg when filled with water, made a perfect radiator, and kept the engine cool.

The fact that the crank was broken caused but a moment's delay. A strong push was all that was required; and then, throwing in the clutch, the machine moved smoothly, if not gracefully, down the road.

Thirty-one miles were covered under these condi-

If the tires are called upon to carry a greater load than their dimensions are calculated to bear, no amount of inflation will keep them from flattening under the excessive load. This invariably results in the cracking and breaking down of the cover at its weakest point—where the flange engages the beaded edge. Rusty rims are also to be avoided, and they should be occasionally gone over and cleaned of any rust that may have accumulated. A coat or two of enamel will often prevent further corrosion, or the rims may be given a coat of wax. This is a satisfactory way of treating the rusty rims of an old car. To make a thorough job, the metal should be well scraped and sandpapered. The wax (preferably bees-wax) should be heated and applied in a liquid state. The wax will not injure the rubber, and by keeping out the air prevents further rusting of the metal. The surface of the rim which comes in contact with the inner tube should be smooth. If rough, it is likely to wear and damage the tube, in which case the rim should be wrapped with a layer or two of tape, the loose ends being solutioned in place.

The Neglected Clutch.

The clutch is the most neglected part of an automobile and is probably the most important part of the whole mechanism. There are various kinds of clutches of which the cone leather faced and the multiple disc are the most generally used. The cone clutch if properly designed does not require much attention other than an occasional adjustment for wear and a treatment of the leather surface with oil.

The multiple disc clutch is probably the most flexible and easily handled style of clutch in existence and is now most generally used. It consists of a number of thin plates of steel, cast-iron or bronze, the bronze and cast-iron plates being the most satisfactory. The plates are held together by heavy springs and released by the foot pedal. One-half of the plates are connected to the motor or fly-wheel, while the other half are to the driven shaft; when the car is moving the plates are all held together by the springs, but when the pedal is pressed with the foot the plates slide and the motor ceases to drive the car. This type of clutch is made oil tight and only requires to be filled with light machine oil to be kept in good condition with an occasional washing out with kerosene to remove the used oil and an application of fresh oil.

The makers generally specify how often this should be done, although it is advisable to do so often. When this type of clutch needs cleaning and oiling, it begins to show itself by "dragging" or having a tendency to continue to revolve after the pedal is pressed. This is noticed by a grinding sound of the gears when changing speeds but which disappears after a good cleaning.

Simple Misfiring.

When the trouble merely consists of misfiring in one or more cylinders, any one may quickly find and apply a remedy. First, discover the faulty cylinder or cylinders. Short-circuiting the plug terminal on to the cylinder head by laying the blade of a wood-handled screw-driver in contact with both, while the engine is running, is a simple expedient in the absence of a switch-board or switch plugs, or, if the high tension wires to the distributor have plug joints, each wire may be detached from the distributor in turn. On tracing the faulty cylinder, begin by taking out its plug, setting the points by a gauge, if to hand, or otherwise as close as they will go without actually touching; if necessary, clean the plug head thoroughly with a knife, gasoline, and brush. If this does not cure, change the plug. If this does not cure, the fault will be in the wire from the distributor, provided the misfiring came on suddenly, and was pronounced in character. If the miss be gradual, irregular, and only faintly discernible, the fault may lie in the segment of the distributor disc which supplies current to this particular cylinder. In this case, attention is best postponed till a repair shop is reached, as probably the metal segment has worn, or the insulation round it has worn, and the whole will need re-facing in a lathe; but it is worth while trying to clean this portion of the distributor with emery paper or rag, and if any metallic particles are visibly embedded in the face of the circular recess, to scrape them off, taking care not to seriously roughen the surface (else the wiper will begin to jump).

Over 11,000 Miles for a Single Tire.

A tire mileage record that many motorists will envy was made by G. W. Butler, who won first prize, \$1,000, in the lowest upkeep contest conducted by one of the large automobile manufacturers. Mr. Butler is a chauffeur in the employ of J. E. Clenny, of Chicago, and his daily records were duly sworn to. The Diamond make of tires

was used, and in 17,003 miles covered gave an average of 11,289½ miles each, counting only the tires fully used up, or an average of 9,045 miles, including tires in use when the contest closed. A hint to automobile owners is found in Mr. Butler's system, by which, when a rear tire had run 3,500 to 4,500 miles, it was changed to the front, so that the newest tires were always on the rear.

Trite But Important.

In the matter of tires: Air costs nothing. Use plenty of it. Avoid curbstones. They are hard on tires. If tire bolts are used, keep them tight. Keep water out of the inside of the case. See that there is plenty of clearance between fender and tire. Never allow the weight of the car to rest on deflated tires, even over night. Don't turn corners at top speed. Make repairs at once—delay is costly. Don't let the car slide down hill. An extra tube will save a lot of time fixing punctures.

Over Gearing.

If there is any hill which the car cannot negotiate on bottom speed when in good tune, the car is over-gear.

If the car always labors and threshes a little when accepting its top gear on the level, it is over-gear, and, instead of trying to look as if he were totally unconscious of his pounding engine and threshing exhaust, the owner should apply to the makers for a smaller tail pin bevel. This fault is rather common, and is due to the desire of many owners of small and medium powered cars to obtain a higher maximum speed on the flat than is fair to the mechanism of the chassis.

Start Straight.

Start your car in a straight line if possible, and do not twist around on your steering wheel before you get started. Not only the tires, but the steering mechanism as well will suffer if this practice is continued. Do not run your motor car along in the car tracks, as this grinds down one edge of the tire.

The Gasoline Feed.

When a motorist has become somewhat expert in the running of his car it will be found advantageous to gradually feed until the point is found at which the motor runs well, but will not stand a further reduction. The smaller the proportion of gasoline the more economically the motor will run and the cleaner it will keep.

To Clean the Mirror Lens.

One of the best things to clean lens mirrors is a mixture of equal parts alcohol and water. Denatured alcohol answers the purpose perfectly well. Pure alcohol evaporates so quickly that it leaves the greasy film pretty much as it was, whereas a 50 per cent. solution evaporates more slowly and gives time to wipe the glass clean.

The Chains.

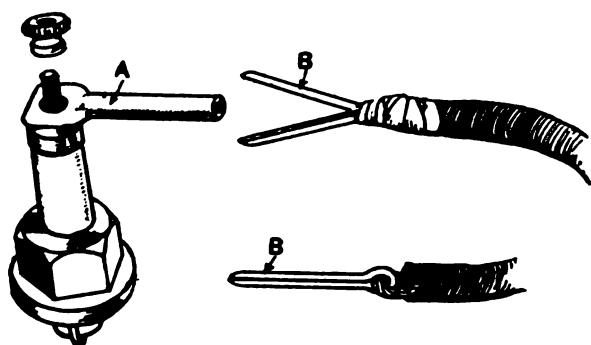
Heat expands; cold contracts. During a cold snap don't forget to loosen the chains. Give them a little more play to prevent snapping or running hard.

A gasoline tank should be cleaned, if possible, by allowing some of the liquid to run through the pipe, disconnected from the carburetor.

If any electrolyte is lost from evaporation, fill up with spare water, but not acid solution, unless splashing has taken place.

An Easily Made Terminal.

The accompanying illustration shows a satisfactory terminal which can be used either for high or low tension wires, accumulator connections, and wires from electric lamps. A is a piece of copper tube flattened at one end and perforated to fit the sparking plug, commutator, or



A Good Terminal.

accumulator terminal. B is a split pin, which fits the tube A closely before being split. This split pin is attached by its loop to the wire (high or low tension), and well secured by adhesive tape. The chief advantages are, ease of detachment, excellent contact, and security from shaking loose.

High and Low Tension Ignition.

The advocates of single high tension ignition for automobile engines claim they see signs of retreat on the part of the partisans of low tension in the action of certain of the latter, who announce that they supplement their system, a cushion make-and-break system, with "also high tension for magneto." This, the believers in high tension ignition hold, is the best kind of an answer to those on the other side of the question, indicating that the latter lack confidence in their own policies and methods. Nevertheless the low tension adherents present a line of arguments, to which the high tension people make reply. It is argued that low tension, with a voltage of about 100, is productive of volume of spark rather than high pressure, that the reverse is true of tension, with a voltage of 12,000 or 16,000, and that the latter is therefore less efficient. In reply the high tension contingent points to the reliability attendant upon high voltage work. Similarly they answer other low tension arguments. When it is argued that multiplicity of parts is an accompaniment of high tension, they reply that multiplicity of parts is important only when those parts are moving and especially reciprocating.

Keep to One Kind of Oil.

A man is often told to choose one brand of tobacco and keep to it. It is equally good advice to recommend readers to use one brand of good oil and always employ it. This advice is certainly worth following when touring, as many of the samples sold as oil are unfit for use. Three two quart tins take up a great deal of room in the car locker, so it is advisable to fit an extra tank inside the bonnet. Cars which are mechanically lubricated need no more attention than keeping the oil up to the required level, and it is far more convenient to maintain this level by turning on a tap from a reservoir than by pouring in the oil from a can.

A six-wheel forty-horse power motor car has been turned out in England for family travel, being fitted with ample sleeping accommodations and almost every household convenience.

Crossing Over Crushed Stone.

In the case of a short stretch, and when a detour to avoid the stones is impossible, it appears to be the general opinion that the manner in which least harm can be done to tires is to run declutched over the section at as low a speed as possible. That is to say, the driver should take the patch declutched sufficiently fast to land just clear of the stones on the other side. This requires some little judgment, for it is obviously highly undesirable to enclutch and deliver drive to the back wheels while still on the destructive surface. On the other hand, if the patch be of too great a length to be free-wheeled in the manner suggested, it is generally considered best to change down to first speed, and at that speed to pass over the stretch as slowly as possible. The driving impact is thereby greatly lessened, and the tires are saved to the utmost possible degree.

Tightening Terminal Wires.

There is a right and a wrong way to do this. The right way is to twist the bare part of the wire or cable round the terminal in a clockwise direction and then tighten up the terminal nut. The reason for this is that, as the nuts have right-handed threads, the fact of tightening up the nut tends to pull the wire round more tightly. If the wire be twisted round in an anti-clockwise direction tightening up the nut tends to uncoil the wire, and it will slip from under the nut while it is being tightened or when the vibration of road work comes into play.

To Clean the Garage Floor.

A good method for removing oil and grease from any floor is the use of a hot, saturated solution of common washing soda. This is prepared by dissolving as much of the soda as possible in a quantity of hot water. The solution can be made up in quantity and stored away in a barrel or elsewhere. When ready to clean the floor, the solution should be heated to near its boiling point and applied hot, supplementing its unaided action by a vigorous sweeping with a stiff broom or brush.

Paint In Oil Holes.

If a motorist decides to have the body and chassis of his car repainted, he will do well to see that all exposed oilholes are stuffed with felt or waste to prevent them becoming choked. Failure to observe this precaution will result in their becoming clogged with paint, which, if not removed before the car is placed in commission, will prevent oil reaching the bearings.

Running Economically.

When a motorist has become somewhat expert in the running of his car, it will be found advantageous to gradually reduce the feed until the point is found at which the motor runs well, but will not stand further reduction. The smaller proportion of gasoline the more economically the motor will run and the cleaner it will keep.

Hill Climbing.

In climbing ordinary hills that are greasy, a moderate speed should be maintained from bottom to top, avoiding any sudden acceleration of the road wheels, and momentarily easing off the drive to enable them to regain their hold at the first signs of excessive spinning.

Covering the bottom of the battery box with a layer of bicarbonate of soda is a preventive of corrosion.

A temporary repair can be made on a leaking water pipe by binding round several layers of string well soaked in thick oil.

CARE OF TIRES.

Their First Cost and How to Prolong Their Life and Usefulness.

Some of us have a great deal more tire trouble than others, and as there is a good cause for everything there must be one here.

Is it not true that some of us try to economize too much in the purchase of our tires, and as an excuse for this we say to ourselves, "all tires will puncture and cut and I really cannot see why I should pay high prices?" Automobile tires are made from materials which, if good, are expensive. It is possible, however, to so dilute or substitute these materials as to effect an enormous saving in manufacture and still make something that has the same shape and for a time acts the same as a good automobile tire. But we all know that where first-class quality is an object judicious extra expense is economy.

There are several methods by which we can greatly lengthen the life of our tires, but to apply these methods successfully it is first essential that we have the best and strongest combination of fabric and rubber that can be put together. Let us pay the price therefore, get good tires, and then take care of them. It is a mistake to believe that because we pay a little more for our tires they should stand any kind of hard treatment we wish to give them and require no attention whatever.

Have you ever told your chauffeur to, or do you yourself, glance over your tires each day to see what condition they are in after the previous day's wear? You look to see that the gasoline tank is full, that there is plenty of water in the radiator, that you have a sufficient supply of oil, and also perhaps test the batteries. Why? Because you know that these precautions are absolutely necessary. Is it not a fact, however, that very little, if any, attention is paid to the condition of the tires?

There may be a little hole in one of the envelopes that does not seem to have caused much damage, but it is really more serious than you think. The rubber has been chopped clear in to the fabric. You run the tire in this condition and the water works through the threads of fabric under the tread of the tire for a little distance in every direction from the cut itself. The rubber retains this dampness and in a short time the threads of the fabric have rotted and the hole begins to spread. How can we overcome this? Fill the cut with Mastic when it is first noticed, and this process of deterioration will be immediately stopped and the life of the tire greatly lengthened. A two-ounce can of Mastic costs only 40 cents and it will save you many dollars.

Mastic is a ground gum. It fills the holes in the tire instantly without the use of heat and can be applied on the road if necessary.

It is an ordinary thing to hear a man claim that he always pays particular attention to keep his tires properly inflated, that he has "100 pounds in each tire." He does not keep his tires properly inflated, as 100 pounds is not the correct pressure, and it is a mistake to think that it is only necessary to keep your tires inflated to more than the pressure called for. There is a correct pressure per square inch to be used in each size of tire. It will take only a moment to ascertain with an instantaneous pressure gauge the exact amount of air in each tire before starting out, and this practice will do much to eliminate tire trouble and increase tire service.

Every tire company should make it a point to see that their customers secure fresh stock, but, this is in many cases neglected.

Just Before a Tour.

Before starting on a tour the motorist would do well to make a systematic survey of every item usually carried. Every broken, or otherwise useless thing, which has been thrust back on previous occasions in the tool drawers, should be rejected, while in their place the available space should be filled up with new fittings, each one of which has some specific purpose that may be useful. Things which can be purchased nearly anywhere nowadays, such as sparking plugs, oil, and grease, need not be carried in such profusion as formerly, but parts which are specially adapted as spares to the mechanism of the car—valves with their springs, ignition fittings, and duplicates of all delicate parts, which previous experience has proved as being the most likely to need renewal by the roadside—should not fail to be included in the kit. Too much importance cannot be paid to the adequate supply of convenient wrenches to fit every bolt and nut on the car, and, moreover, these should be in duplicate, for the reason that it frequently happens that on trying to unscrew a nut the bolt turns round as well, and unless one has a second spanner to hold the head of the bolt no amount of turning will suffice to withdraw the nut.

Car Owner Not Responsible.

Most farmers believe that if one of their chickens is run over by an automobile that the owner of the car is responsible for the loss. This is not the case. No living creature of the farm has any right to wander on the highway except at the owner's risk. Not long since a farmer in this State brought suit to recover value of some of his fowls that had been run over and decapitated by a speeding auto on a back country road. The court held that under the highway law in relation to estrays, fowls on any public thoroughfare, even in front of the residence of the owner, are not only unprotected from such an accident as being killed by a motor car, but may be taken and impounded the same as cattle, horses or sheep. Owners or drivers of automobiles are not liable for the values of poultry that may be run over and killed on a public road. When fowls are permitted to wander on a public highway the owner must take the risk of accidental loss.

Wore Away the Insulation.

The other day a motorist, just before starting his car, shoved the switch lever of the coil over on to the battery side. The switch immediately began to smoke, so the switch was swung over to the other side and the motor swung on the magneto by spinning it. The car was then taken to the dealer from whom the coil was purchased and a new coil and switch secured. An investigation showed that whenever the switch was shoved over on to the battery side it rubbed against the wire connected with the negative terminal of the battery. This little rub every time the motor was started at last wore away the insulation and caused a short circuit, which heated up the wire to such an extent that the rest of the insulation was immediately burnt off. The burning of the insulation caused the smoke which was seen to issue from the switch. In wiring up a switch always cut the wires a little long, allow plenty of clearance for moving parts connected therewith, and where wires pass over sharp metal edges it is advisable to wrap a few layers of tape around those portions.

Gasoline in the barrel does not keep the engine running.

Automobile Dealer and Repairer

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ADVERTISING RATES MADE KNOWN ON APPLICATION

NEW YORK, SEPTEMBER, 1909.

Missing Numbers—Our readers are requested to remember that it always gives us pleasure to re-send numbers which have gone astray in the mails.

The Automobile Dealer and Repairer in Australia and New Zealand.

Mr. R. Hill, Matlock House, Devonport, Auckland, New Zealand, is our accredited representative in Australia and New Zealand for obtaining new subscriptions.

GRADE CROSSING ACCIDENTS.

One of the most frequent causes of automobile accidents—and of accidents by far the most destructive and fatal—is reckless driving over railway tracks.

The recklessness shown is simply amazing. Of course there is but one prudent course to pursue, and that is to invariably come to a full stop and listen and look to find out if a train is approaching. This requires a little time—possibly a minute or two—but if one places any value on his own life or that of others who are entrusting themselves to his care, he will do this every time.

It goes without saying that grade crossings are such a public menace and such an audacious violation of public rights, that they should at once be swept off the face of civilization. But they are here, and here to stay for some time yet, and this riding over tracks at grade by simply "chancing it" is rank. Had we not investigated so many cases of this kind, we should be inclined to attribute such gross foolhardiness to whiskey befuddled brains, but much as intoxicating liquor is responsible for, not a tithe of the cases reported are due to it. Strange as it may seem, normal brains indulge in the custom with impunity. Scores of such cases have been reported the past month. Here is one appalling case, that is a fair example of the general recklessness: Near St. Louis an entire party of five persons were killed by a Rock Island train, and although wide publicity was given to the matter on account of the social prominence of the victims, carelessness and ignorance are as likely to be found among the high and mighty as among the poor and lowly.

According to passengers on the train, the chauffeur said after he was picked up, "I saw the train, but thought I could beat it across the track." Later he said that the engine did not whistle, or he could have

stopped the auto before he increased his speed to make the grade at the crossing.

The brakes of the automobile showed that it was running at high speed, and it is probable that the driver took the slight incline running up to the railroad tracks at about fifteen miles an hour. It was impossible for him to see the train until it was within about 50 or 75 feet of the crossing, as bushes and trees shut off the view. The engineer said it was impossible for him to bring the engine to a halt before he did without danger of the sudden jolt causing the engine to leave the track. The fireman said he blew the whistle and rang the bell as they approached the crossing.

It would seem as if a knowledge of the true facts of the above sad affair without any of the details of mangled bodies strewn for a quarter of a mile along the track, would be warning enough to others. But it will not. The work will go on in degree until grade crossings are abolished.

SECOND HAND CARS.

No one should buy a second-hand car without the most rigid inspection. The paint, varnish and upholstery may be of the most favorable appearance and yet the car may not be worth much. The only way to really find out the value of a second-hand car is to dismantle the engine and examine the condition of the cylinders and bearings. See that the cylinder is not scored at the bearings and that it is not cracked. To find this out it may be necessary to put an incandescent light inside. See that the axles are straight and that all the wheels run true and parallel. Find the number and type of the engine—if it is worth anything you will find such marks—and write to the manufacturer to find out the date of the manufacture. Insist on a day's trial on rough and hilly roads. Note carefully whether it is a car that is now being made or a pattern that is obsolete. Finally, consider well whether the car is one that will just meet your requirements for power and size. If a thing is not just what you want it can hardly be cheap at any price.

There are numbers of good sound second-hand cars for sale which are well worth purchasing at the prices at which they are offered, but no one should buy unless he knows the difference between the signs of fair wear and tear and absolute neglect or unscrupulous disguising of defects.

Persons of wealth often discard very good cars indeed to secure something different and perhaps no better. When such a second-hand car can be purchased there is little danger of getting cheated.

CARS ON THE FARM.

There is no better gauge of the country's welfare than the prosperity of the farmer, and if at last he is securing fair returns for his industry and for the lonely isolation in which he is often placed, we should all rejoice.

One of the best evidences of his increased material well-being is the fact that he is buying automobiles, and he can make no other expenditure that will give him so much real pleasure and comfort. Almost any kind of a car will take him to town before his horse-driven vehicle could be fairly started, and the cutting down of time fully two-thirds to reach a neighbor or to get the mail is something that will add much to the amenities of farm life.

In the town of Milford, Neb., which has a popula-

tion of only about 900, it is said that within the corporate limits are to be found twenty-one automobiles, owned and run by Milford residents. Within a radius of one mile of Milford there are twenty-two more automobiles, making a total of forty-three in the town or within one mile of it. They are not all runabouts, either, but for the most part they are good-sized cars of four and six cylinders, and it goes without saying that they are run with rather greater skill than city men run cars.

An especially gratifying feature of the matter is that the farmer is no longer spurning the automobile, and has become one of its champions. Feeling thus, he will more than ever see the need of good roads, and good roads are the greatest need of the country.

But the condition found in the Nebraska town referred to is said to be typical of the tendency all over the State. The farm has become a big business institution and the automobile is well adapted to its use because it is a great time-saver. The great prosperity of the farmer now makes it possible for him to provide himself with the best and most efficient implements of his calling, and of these the automobile stands at the head.

BULK NO CRITERION OF VALUE.

In buying their reading matter many seem to consider bulk and weight as an element of value. It is nothing of the kind. Information that can be absorbed quickly and easily is worth far more than that which requires time and effort to acquire. The size of a publication is a poor criterion of its value.

An idea is sometimes susceptible to tremendous concentration, or it may be greatly enlarged and diffused. It may be stripped of all useless verbiage until it is as clear as crystal, or it may be so enlarged and infused with words and scientific terms that it puzzles and mystifies rather than informs.

Place a diamond in a snow-ball and roll it down hill, letting it gather the snow as it progresses, and when it reaches the bottom it will be as big as a barrel. But the value of the diamond has not changed by the process; on the contrary, it has been impaired by the time and labor required to get it out of its frosty covering.

Bury an idea in several pages of words and it has not improved by the process. An idea worth hundreds and possibly thousands of dollars may be expressed within the compass of a half-dozen lines. Facts need no ornament, but like beauty "unadorned are adorned the most."

It has often happened that a subscriber to this journal has got his money's worth and a great deal more from some simple idea expressed in a few words. If, however, he happens to belong to that class which measures the value of a publication by its bulk, possibly he may not appreciate the fact that ideas and information are best presented in the simplest and shortest way.

It may be just a bit trite to repeat the old adage that "things of the most value are done up in small packages," but yet it is well not to forget the truth of it.

MUST BE IDENTIFIED.

It is simply a question of time when some other method than that used at present will be devised by which car drivers cannot escape after having recklessly run over some one.

The present means of identification are totally inadequate to the requirements. If the culprit wishes to escape, he can often do so in the darkness or dust and confusion following such a disaster, and of

course it is the class alone that wants to escape that is under consideration; identification is easy enough with the present method if the party responsible for the accident has no wish to avoid its consequences.

The situation seems to be growing worse all the time. Once the unscrupulous found that escape without detection or identification was possible, the tendency has been growing to not slow down but to get out of sight as soon as possible. What makes matters worse, in some cases, according to the daily press, the culprits have been inhuman enough to laugh as they sped away out of the reach of the law.

Now automobile drivers are no better and no worse than drivers of horses or any other class in the community. As a rule they are quite willing to shoulder the responsibility for any damage they incur, but it is the unscrupulous remnant that those who use the streets and highways must be protected against, and this is quite as important to general automobile interests as it is to any others.

SPACE SPONGING.

The number of eminently respectable firms and companies begging for space in trade journals in which to exploit something or other they manufacture, is remarkable.

No man connected with one of these organizations would probably consider for a moment the idea of asking the proprietor of a hotel to furnish him with a room and meals free of charge. Such a proposition would be too ridiculous for consideration.

These same people, however, will send article after article to a trade journal under the pretense that they are "new," and ask to have them published without intimating that they expect to pay anything for the service.

In point of act, they do not expect to pay for it. To speak plainly, it is their intention to sponge on the publishers. All the publicity they succeed in getting in this way they regard as so much clear gain.

Fortunately the editors of trade journals, most of them that are worth anything, are at the present time excluding all such material from their pages.

A FEDERAL LAW.

There is no reason why automobile laws should not be absolutely the same in every State. Locality as defined by geographical lines has nothing to do with the running of a car. That which is unsafe or inimical to the general welfare in one State is so in any other. There should be universal automobile laws and a single registration should answer anywhere in this broad land. We understand that a movement is on between the five States of New York, Pennsylvania, New Jersey, Connecticut and Massachusetts for a general law, and to have the license number in any State good in any other State.

But the movement for a single law may just as well be applied to all the States as to five. The sooner a Federal law can be passed the better.

ASK QUESTIONS.

We wish our readers would ask more questions concerning the troubles they may be having with their automobiles. It is always a pleasure to answer questions, even by letter if the writer is in a hurry for the information, and will so state in writing.

Tell us about your "Troubles," whether little or big, and let us help you. At the same time you must realize that every time you ask a question, you are helping somebody else.

LESSONS FOR DRIVERS.

Carelessness and Ignorance Responsible for Most Accidents.

Certain kinds of accidents seem to be like the Scriptural poor, "always with us."

Just why there should be so many cases of collision with bicycle riders, for illustration, seems rather singular in view of the fact that the wheel is not used widely in most localities. But the bicycle is an unmanagable vehicle and calls for more road space than its length and breadth indicate. It is a "wobbler," and is often used with gross carelessness. Automobile drivers should beware of the wheel and give it a wide berth. In case of accident the blame is almost invariably placed on the car, although it should as invariably be placed, where it belongs, upon the wheel rider.

Crossing railroad tracks at grade is a fruitful source of accidents and they are often accompanied by fatalities. We are inclined to think that the car drivers are usually to blame for such disasters. As long as the public permits the pernicious grade crossing to exist, the only safe way is to invariably come to a full stop before crossing one. This is time consuming and annoying, but it is better than getting killed.

Many drivers seem to take delight in trying to take corners on two wheels. They are not often successful however, and quite often they do not live to relate their unfortunate experiences. The driver who does not take corners at a slow speed is flirting with Death. Moreover, in case he is unable to see what is beyond the corner he is liable to have a collision with another driver of the same careless order.

Brakes that fail to work, bursted tires, broken axles or wheels, and striking obstructions in the road each supply a fair share of accidents, but in every case the accident itself or the serious result from it, might have been averted if the car had been going at a judicious speed.

Accidents sometimes happen by stopping a car in the highway at night, and turning it at such an angle that neither the front nor rear lamp can be seen by an approaching car or other vehicle. If a car must be stopped in the road at night for even an instant, it should be parallel with the road, so that the light at either end may be plainly seen by a vehicle from either direction. And it is well to get the car out of the road entirely as soon as possible in case anything goes wrong; the highways are made for travel and for nothing else. No one has a right to obstruct them and they must be occupied solely for travel and not for tinkering with the car or other purposes that obstruct travel.

The list of accidents this month is appallingly long, but they are mostly due to causes that have heretofore been dwelt upon in this magazine at some length. We give only a few of such as seem to point more plainly to a moral.

Over an Embankment.—The lesson cannot be too well learned that an automobile will go where it is sent, while a horse will not. It was widely reported but will bear repeating that a wealthy lumberman and his chauffeur lost their lives by driving a car over an embankment 65 feet high into the Connecticut river near Turner's Falls, Mass. The lumberman drove to the bank of the river to oversee some workmen who were at work on some logs in the river. Just how the car came to go over the bank will never be known, but with almost his last words the lumberman wished

that his chauffeur should not be blamed for the accident.

Result of Confusion.—In the confusion of a sudden meeting of two cars, a carriage, and one or two pedestrians at North Scituate, Mass., a boy was killed and another seriously injured. A cool head, a lower speed, and with all concerned just where they had a right to be, the accident might have been avoided.

More Killed by Trains.—The number of accidents caused by careless driving over railway tracks at grades is simply appalling and altogether beyond computation. In every case the fault was due to the indifference or negligence of the car drivers. The only positively safe way is to come to a dead halt just before crossing the track and look both ways. Here is a sample of a dozen or more. Two women, a baby and a man were killed outright and another man was injured so badly that he died a few hours later when a fast Rock Island train struck a speeding automobile near Creve Coeur Lake, Mo. The bodies of the victims were scattered along the railroad track for nearly half a mile, and the two women, dead, were found in the machine which had been carried on the engine's pilot for that distance.

Physician Crushed by His Car.—While driving near Dunkirk, N. Y., with a clergyman, a well known doctor rounded a curve in the road with too much speed. The car overturned, pinning the doctor beneath, and killing him. The clergyman escaped with few injuries.

Turned Double Somersault.—Four young people were riding near Dayton, O., when the wheels of the car struck a traction railway rail and the car was overturned making a double somersault. It pinned two of the occupants under the wreckage and both were badly hurt. The car driver admits he had a weak hold on the steering wheel when the accident happened.

Neither Turned Out Enough.—Two automobiles, one of them hurrying along to get its occupants home in time for dinner, and the other in charge of a young woman who was just taking her first turn at the wheel, tried to pass each other on a narrow turnpike raised three feet from the drain ditches on either side, on a Long Island road and as a result nine persons are under the care of physicians. The rear wheels of the cars locked as they passed. The young woman driver says the other machine was going too fast. The driver of the other machine says the young woman was on the wrong side of the road and apparently didn't know it.

Ran Into an Engine.—Five were injured when an automobile plunged headlong into a switch engine at the Santa Fe depot in Stockton, Cal. The driver had been speeding the machine, but when he began to near the crossing he slowed down. He observed the engine crossing the street, but did not know that it was going to come to a standstill on the crossing, consequently did not come to a full stop. When he saw that a collision was inevitable he reversed his engine, but the momentum carried the car against the big locomotive. The car is now a junk heap and the occupants are nursing broken bones.

An Old, Old Story.—One man—the chauffeur—was instantly killed, a woman fatally hurt and another woman and a man seriously injured when a big touring car turned upside down in Fairmount Park, Philadelphia, at 2 o'clock in the morning. The motor, with eight persons inside, had been tearing along at a rate far beyond the legal limit. The car, rushing through

the darkness like an express train, skidded on the curve, struck a tree and turned completely over landing on its wheels.

Stopped on the Track.—Three persons were instantly killed, one perhaps fatally injured and another slightly hurt this afternoon when the Michigan Central Wolverine express struck an automobile on a crossing in Bay City. The car driver approached the crossing slowly. The train was late and came along at high speed. The engineer whistled for the crossing and also gave an alarm whistle when the car was within a short distance of the tracks. The auto came to a full stop after the forward trucks had crossed the track, the rear part of the machine standing square between the rails. No attempt was made, as far as could be learned, by any of the occupants of the machine to jump.

Result of a Bursted Tire.—A tire on a car owned by a wealthy resident of Mt. Vernon, N. Y., burst while the machine was running at high speed, throwing the car over an embankment and killing one of its occupants and fatally injuring another.

Choked to Death.—While driving near Watertown, Wis., a man was thrown from his car, pinned beneath it and choked to death. In striking an obstruction in the road the machine veered to one side and tipped over. The entire top was broken into shreds. One of the occupants was caught under the weight of the car and slowly strangled to death.

Dashed Down a Mountain Road.—One woman dead, another perhaps fatally injured, and two other persons slightly hurt is the result of a wild dash of an automobile down Wilkes-Barre, Pa., mountain. The cause of the accident was the breaking of the transmission gear and the failure of the emergency brakes to hold the big car on the grade.

Fatal Grab for a Hat.—New Egg Harbor, N. J., a party were running at a fair speed when a sudden puff of wind took off one of the occupant's hat and he stood up to grab it. The chauffeur applied the brakes quickly and the car skidded. Then he lost control of the steering gear and in an instant the machine left the road, running past a telephone pole, only to strike a tree. The occupants were all thrown out and the man who lost his hat was killed.

Another Tire Bursts.—With the full force of its 40-horsepower motor unleashed through a mechanical defect, and plunging madly at the rate of sixty or more miles an hour near Ft. Worth, Texas, a big seven-passenger touring car containing a man, his wife and six children, jumped like a stricken animal when the rear left wheel caved, and throwing two of the children high in the air, turned completely over and pinioned its other inmates underneath a twisted mass of steel. The driver told the story of the accident thus: "I had just opened the throttle a little wider to gain sufficient power to climb a small hill," he said, "when something jerked and the car plunged along the road at a terrific rate. I tried all the brakes, but they refused to work, and had just put my foot on the emergency pedal when, without any warning whatever, the car turned over and caught my poor wife and babies beneath it. I don't know how long it was before help arrived, and with posts torn from a nearby fence raised the car high enough to extricate my wife and myself, but it seemed like an age to me."

A Tire Burst.—A party of five men applied at a garage in Schenectady, N. Y., and asked to be taken to Amsterdam. The start was made and it is reported that the machine was going at a high rate of speed, when the rear left tire burst. This caused the auto to skid and after turning a half circle, struck a fence.

The car crashed through the fence and rolled down the high embankment. The occupants were thrown but fortunately landed in the waters of a canal. The gas lamps were burning and the gasoline tank exploded, causing the car to take fire. Before the party could swim to the shore, the entire machine was a mass of flames and it was impossible to save it.

Car Moves a House.—Near Long Island City, N. Y., a party had just stopped at a farm house to get a drink of water, the men alighting from the car and going to the pump. While there the throttle on the machine was accidentally opened and the machine started. After running about two hundred yards it turned and jumped a four foot ditch and ran into the house, smashed it, wrecking the front part of the machine and jarring the house four inches from the foundation. Just as the car jumped the ditch one woman jumped and alighted ten feet away on her right shoulder, dislocating that member. Another stayed in the car and escaped with slight bruises about the face and head. Those who witnessed the flight of the car say it was miraculous that either occupant escaped with her life.

Turned Three Somersaults.—Although a big tour-car turned over three times when it skidded from the road in the country, ten miles north of Muncie, Ind., none of the four occupants were killed. Two, however, were seriously injured, but it is believed they will survive. The machine was going at least thirty miles an hour, and was making a turn in the road when the rear wheels skidded over a high embankment and the machine rolled over and over, being demolished when it finally brought up at the bottom of the ditch. The driver of the machine was thrown directly through the glass wind shield. Two young women were thrown through the top of the car and a man was beneath the car when it stopped.

Fatal Mix-up.—Just how a young man lost his life and another was severely injured near Lowell, Mass., is not easily explained. It was a meeting and a passing of two automobiles, a carriage and a party out walking. It is sufficient to say that if the cars had been going at a moderate speed—for that time and that place—the accident would not have occurred.

Result of Roadside Repair.—A woman automobilist was killed near Portland, Oregon, she being one of a party of five or six persons whose automobile had broken down. While repairs were being made the autoists walked up and down the road. Suddenly a big red car came down the road at high speed, struck the woman and threw her thirty feet from the road, killing her instantly. The red car continued on its way and was soon out of sight.

How to Spoil the Varnish.

The use of needlessly strong alkali soap in cleaning cars, neglect to wash off the soap and failure to dry the varnished surface perfectly are probably responsible for more damage to paint than all other causes combined. As a matter of fact, neither soap nor water should ever be used on a car above the under sides of the mudguards, except in cases where the mud is caked on the body in large quantities. In most cars the first signs of wear of the painted portion invariably show on the varnished surface of the engine bonnet. This is due to the fact that it is frequently covered with mud on the return from a run and is then washed with soapy water while the metal is still hot. Soap should not be used on the bonnet until it has cooled, and even then should be carefully washed off.

THE REPAIR SHOP

SCREWS AND WRENCHES.

Why Lost Motion is Destructive to an Automobile and How to Remedy It.

BY JAMES F. HOBART, M. E.

The mill-owner says that were it not for repairs, he would get rich in ten years. But there are repairs and he can't help it. The automobile owner submits that were it not for screws, his machine would be almost ideal and that the parts would never rattle. But he can't get rid of the screws without being worse off in many directions than he is now. Therefore, screws will stay with the gas wagon for a few years yet. The weld has been abolished from motor vehicles, for it will not stand the racket. The repair man who uses a weld as usually made, in a smith's fire, should be black-listed by every automobile association in the country. Autogeneous welding may stand the shocks and jars to which welds will be subjected, but not every smith is equipped to do autogeneous welding.

But that is no reason why each and every repair man should be so equipped. Autogeneous welding is no new thing. It has been practiced for, I might say, hundreds of years, but under another name. Probably many a repair man is familiar with lead-burning, but how many would recognize it under the very high-toned name of "Autogeneous welding"? That is just what lead burning is. If we said "steel-burning" or "iron-burning" we would say "autogeneous welding" under another title. This art is merely soldering two pieces of a metal with a strip of the same metal for a solder, and using a gas-heat which will melt the portions to be soldered, or welded, before the heat can be conducted away by the metals which are being soldered. Oxygen and acetylene gases, mixed together will do the trick, and the repair man should make common use of the autogeneous form of welding.

But to come back to the screw business—How many screws do you suppose there are in your automobile—if you have got one—which are loose from a quarter to a full turn or more? It is safe to say that if there are not a dozen loose screws in your machine that you have not got an auto! Only to-day, I was riding in a fine four-cylinder machine which ran very well indeed, but which gave me an indescribable feeling of looseness. It seemed that there was a vibration in each part, from mud guards to engine case, which did not belong there. Almost everything touched, seemed to yield to the hand a little and few things about the machine seemed solid or rigid.

After arriving at the garage, an opportunity presented itself to go for some of the connections with a screwdriver and hardly a screw was found which could not be tightened a part of a turn, and in several cases, more than a full turn. Even the lid of the force-feed oil tank—supposedly an airtight piece of apparatus—was found to have a row of loose screws around the top! And when it came to the minor attachments, each and every screw was loose to the extent of one or two full turns! The attachment, for instance which held the rubber horn squeeze was sagging in two directions with nearly 1-16 inch of space between the bracket and the screwheads!

But while the screws should be tightened, it is not intended that they shall be so laid upon with a big screwdriver that the slot is torn to pieces or the screw broken

in two. Sometimes neither thing happens, yet damage is done by stretching the screws. Usually, a screw will snap short off under a too vigorous application of the screwdriver, but sometimes the power is stopped just short of the breaking point, but such a strain is left upon the screw that the metal is stretched.

A fine application of the stretching business to metal may be made by twisting a bit of fine iron or steel wire around a hammer handle, or some other object which will permit of a good grip upon it with both hands. Catch the free end of the wire in a vise, or fasten it to a post or some firm object. Then take hold of the wire-wrapped hammer handle and pull gently at first, then increase the strain slowly and carefully. If the wire is small enough—No. 16 or smaller, you can pull it in two, and before the wire breaks, you will feel it yield and

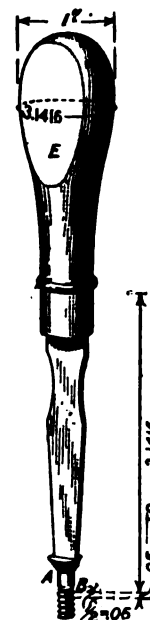


Fig. 1—Leverage of a screwdriver.

stretch considerably before it finally snaps. If you stop pulling just before the break occurs, it will be found that the wire has stretched so much that it is considerably smaller at the point where the stretch took place.

The same thing may have happened to the screw, but you let up on the screwdriver after the metal had stretched, but just before it was ready to break. Let's investigate a bit and find out what strain the screw can sustain, then we will calculate how much strain was, or could have been put upon the screw by the screwdriver under the existing conditions. Measure the screw carefully at the bottom of the thread. The diameter across the top of the thread has nothing whatever to do with the strength of the screw, so don't bother with that measurement.

The area of the screw at the bottom of the thread is that of a small circle $\frac{1}{8}$ inch in diameter. The breaking strength of soft steel is about 60,000 pounds to the square inch of cross section, and we have about one-eightieth of a square inch which will break under a pull of 720 pounds. The screw is just strong enough to stand this pull, and it may hold, or it may break under that load. Now, for the stress which may be placed upon the screw

by means of the power exerted by the hand, and applied through the leverage of the screw. And the leverage must be the first thing determined.

Fig. 1, may aid in understanding screwdriver leverage. The screw, A, has a diameter at the bottom of the thread, as stated above, of .125 inch, but the pitch of the screw—the distance between threads, is as shown, .05 inch. This distance is the short lever of the screw. It makes no difference to this end of the lever how large or how small is the diameter of the screw as long as the pitch of the threads remain the same. Thus, the diameter might be increased to 3 inches, or even to 5 inches, or any larger diameter, without in the least changing the short arm of the screw lever. Keep this fact well in mind when calculating the leverage of screws.

The screwdriver, E, has a diameter of about one inch, as shown, which represents the size of the screwdriver handle before the sides were flatted to give the hand a better grip upon the tool. The circumference of the handle is 3.1416 inches, and this distance will be the long arm of the lever which acts against the short .05 inch arm described above. The lever arms of the screw, are then, 0.05 inch and 3.1416 inches respectively. Dividing these into one another, the result is 62.5 and this means that each pound of power applied to the screwdriver by the hand, at E, will exert 62.5 pounds at B, to pull the body of the screw apart. Thus, were 20 pounds exerted at E, the strain at B, would be 1250 pounds, more than enough to pull in two the dinky little screw A, which at best can stand a pull of only 720 pounds. Even when we allow a loss of one-half for friction of the screw, there still remains a stress of 625 pounds, more than enough to stretch the screw even if not quite enough to break it.

The same line of reasoning applies to the use of wrenches on the nuts of bolts. A one-half inch bolt is 4-10 inch in diameter at the bottom of the thread and this gives an area of .1256, or about $\frac{1}{8}$ inch. This should break under a load of 7,536 pounds. But it is never safe to load a bolt or any other piece of mechanism to anywhere near its breaking strength. There should be a generous factor of safety allowed—from 4 to 10, according to the manner in which strains are placed upon the bolts or other members. Therefore, if the bolt be in the engine or transmission where it is subjected to shocks, it should never be loaded to more than 1-10 its breaking strength, or to about 754 pounds. But if the bolt be used to hold the frame of the vehicle together it may be safely loaded to nearly or quite a ton of 2,000 pounds. Therefore we find the general statement that "a half-inch bolt is good for a ton!"

But now for the wrench business. The standard thread for $\frac{1}{2}$ inch bolts is 13 threads to the inch, or .0769 inch pitch. We will call it .077 inch in the leverage calculations. Sometimes you see a man put an 18 inch wrench on the nut of a $\frac{1}{2}$ inch bolt, and then pull with all his strength. Why the bolt holds is to be wondered at, not why it occasionally breaks. An 18 inch wrench gives a man about 15 inch of leverage from the center of the bolt to the middle of the hand. This means that—neglecting the friction of the screw—that 1,223 pounds pressure will be exerted by the bolt for each pound of force applied to the nut at the end of an 18 inch wrench, or at a point 15 inches from the center of the bolt.

And when one-half of this is cut out as an allowance for friction, there remains more than 600 pounds to be applied for each pound of pull on the wrench. If the repair man feels strong, and pulls 50 pounds, he is exerting a pressure of 30,000 pounds upon a bolt which is only good for 2,000 pounds, and which should break at about 7,500 pounds. Should the workman exert his ut-

most strength and pull even 100 pounds upon the wrench—something very easy to do, the bolt will be under a strain of 6,000 pounds. Is it to be wondered at that bolts break when treated with such "wrenchedness?"

Lost motion in the screws of a vehicle not only cause rattling and a general "shakiness" of the entire vehicle, but it is also in certain cases, a most prolific cause—or perhaps aid—in the breaking of the parts supposed to be held in place by the screw which becomes loose. It has been shown that the straining of a screw too tightly will probably cause a breakage of that screw, and it can also be shown that looseness of a screw may lead to strains equally bad—bad enough to break the bolt or screw, at any rate.

Fig. 2, shows the situation when a loose bolt or screw can cause a considerable strain upon itself. The arm, or bracket A, will be considered as attached to the inflexible support B, by means of screw C, which has worked out 1-16 inch as shown, the outer end of the arm A, carries a weight, D, which may be a searchlight or any other object, and which it will be assumed, weighs 50 pounds. As the vehicle jolts around, the weight D, vibrates from F, to G, a distance of $\frac{1}{2}$ inch. It is now required to

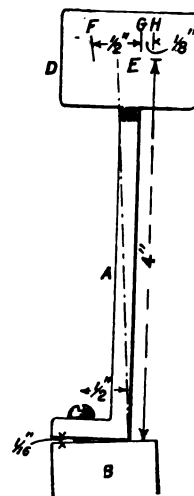


Fig. 2—Strain caused by a loose screw or bolt.

ascertain the strain placed upon the screw C, by the vibration of weight D. As the distance from B, to E, the center of gravity of the weight D, is 4 inches, it is evident that, should the arm or lever B, lie in a horizontal position, the strain due to the leverage would be 800. Thus the weight alone is enough to require a $\frac{3}{8}$ -inch screw at C, to make the thing safe.

But there is another force which is exerted against the bolt which is not shown by the calculations given above, and, which may under some circumstances be in addition to the 800 pounds load already noted. In order to determine the amount of this force, it must be ascertained the force with which the weight D, will strike when thrown through the distance F, G, by the jolting of the vehicle. If the weight D, were to fall by gravity, the velocity would be calculated by the formula for falling bodies which can be found in any school book on physics. But in this case, it is not gravity which causes the motion. It is the jolt or jerk of the automobile and we can only estimate the time required by hanging such a loosely connected piece to some portion of a vehicle and then taking observations as best we may while the automobile is running.

From as close estimates as it was possible to make, the writer determined that the movement from F to G, took place in about 1-100 of a second, and upon this assumption we will proceed with the calculations. There

is no book on physics at hand, but if I remember right, the force of a blow of this character is equal to the weight multiplied by the square of the velocity and divided by $2g$, which is about $2 \times 32 = 64$ or it would be were it possible to stop the weight instantly when it has arrived at the end of its travel, but this is impossible. In this case, the weight travels the distance GH , while it is stopping, this travel being made possible by the elasticity or spring of the lever arm A , which in this case, is $\frac{1}{8}$ inch.

This puts a new face on the matter. Instead of the striking force being the square of the velocity times the weight divided by twice "gravity," the " $2g$ " or 64 must be multiplied by the distance the weight travels while it is coming to rest. Now, to figure it out:—To travel a distance of $\frac{1}{2}$ inch in 1-100 second will be 100 half inches in one second, or 50 inches, which is equal to 4.16 feet. All the dimensions must be in feet because g is calculated in feet and it means that a body which has fallen 16 feet in one second has a velocity of 32 feet at the end of that second. There is a small fraction attached, but we will not trouble that for these calculations.

We have found that the velocity of the weight is 4.16 feet a second. The square of this is 17.30, and multiplied by 50, the weight of D , it amounts to 865. But this amount must be divided by $2g$, or 64 , which gives 13.515 pounds, or foot pounds, which is the work the weight would do were it to be brought to rest in one foot instead of $\frac{1}{8}$ inch as is the case in this instance. If the weight were brought to rest gradually in two feet, the blow with which it struck the screw C , would be only 6.757 multiplied by the leverage of 8, which we found to exist between the long and short arms. Thus, even when the weight is stopped in two feet, it can strike a blow of over 54. pounds.

But the stopping distance is much less than two feet. Indeed, it is only $\frac{1}{8}$ inch, which corresponds to 1-96 of a foot. We found that the blow which was struck by weight D , when its travel was arrested in one foot, was 13.515 pounds. But now we find that the weight was brought to rest in 1-96 foot, hence the striking force of that 50-pound weight is 1,296 foot pounds! And is not that quite enough to jar that screw a little—which we found was good for only 800 pounds or so! Is it any wonder that it broke? It stands the auto man to keep lost motion out of the screw connections all the time!

Valve Treatment.

Sometimes a difficult case of missing at very low speeds has been accounted for by the valve stem being a loose fit in the valve guide. Too many valve guides are of cast-iron. If, however, it is necessary to bush them an excellent bush may be made out of mild steel, provided it is carbonized, i. e., soaked in carbonizing material such as bone or burnt leather, for an hour or more at a bright yellow heat closed up in a pot. Thus treated, mild steel will replace (more advantageously) cast-iron anywhere, and has remarkable anti-friction properties. This same treatment can be applied with great success to all valves. Care is necessary not to attempt this to nickel steel valves, or any but mild steel valves of 18 per cent. carbon or less. They then have the virtue of not pitting, and the stems practically never wear at all.

Speaking of valves, another mysterious cause of apparent misfiring hard to locate is when the valve stem is too good a fit in the valve guide, and occasionally sticks up instead of coming down.

Another discrepancy has been found in many repair shops. The part of the cam which should have been truly circular was not so, and a bump or prominence left on the back sometimes lifted the valve slightly off its seat, and often caused the carburetor to ignite.

THE OUTSIDE SPARK.

Why It Is Useful and Is In General Use In Great Britain.

BY SYDNEY F. WALKER.

In Great Britain, the outside spark has become pretty general in most automobiles. By the outside spark is meant, a spark, in the ignition circuit, outside of the cylinder, formed by a break in the circuit, as shown in Fig. 1, which jumps its break, at the same instant as

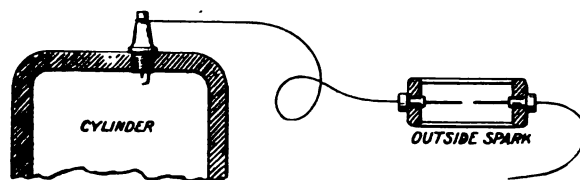


Fig. 1—Diagrammatic sketch showing arrangement of outside spark. The secondary, leading to the spark plug, is broken, and an insulated fitting, holding a part of the adjustable contacts, is inserted in the breaks.

the spark on the inside of the cylinder, which fires the explosive mixture.

In the first place, the outside spark, if it is placed in some convenient position where the driver can see it, or where he can get at it without much trouble, is a very useful guide. If the outside spark is jumping properly, it is practically certain that the inside spark is also. It is not an absolutely infallible guide. It may happen in a very few cases that the outside spark may be jumping while the inside one is not, or is only feeble. Those cases would be very rare.

Next, the outside spark, if properly arranged, frequently adds to the force of the inside spark. At first sight it would appear as if the outside spark would weaken the inside spark. The outside spark may produce such conditions that no spark can pass, that is to say, that there is too much spark gap in the circuit, so that the coil and its battery, or the magneto have not sufficient pressure to jump the two gaps, but this merely means that the coil and its battery, or the magneto, are not powerful enough.

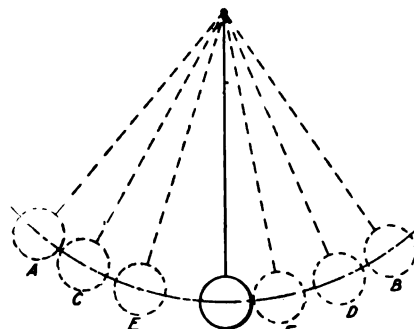


Fig. 2—Diagram to illustrate the action of a pendulum. When the bob is drawn to A, say, and released, it will swing over to B. It will then return to about C, swing to about D, return to about E, swing to about F, and gradually come to rest if it does not receive a fresh impulse.

The writer would look upon it as an additional benefit conferred by the outside spark. In the ignition outfit of motor cars, as the writer has pointed out on other occasions, there is too great a tendency to cut things close, to have too small batteries, too small coils, and so on. If the addition of the outside spark obliges the power plant of the ignition outfit, as it may be termed, to be increased, it does good work.

WHAT THE SPARK IS.

The spark from an induction coil or a magneto is not simply a current, in the ordinary sense of the term. It is an oscillating current, working very much on the lines of the pendulum. It will be remembered that if the bob

of a pendulum is pulled as far as it will go on one side of its center, and is released, it will swing to nearly as far on the opposite side, will then swing back to nearly its first position, back again, and so on, as shown in Fig. 2. This is exactly what the current does, when a spark is passing. The time occupied by the spark is so very small, that it is difficult to imagine that it can be an oscillating current, but it is. The oscillations take place some 10,000 times per second. That is to say, a current passes first from one platinum to the other, then quickly back from the second platinum to the first, back again, and so on, and the currents passing in these oscillations, follow the same rule as the pendulum, and gradually become weaker and weaker till the spark finally dies out.

The second spark may be looked upon as a second pendulum, and if it is properly arranged, it will assist the first spark. Imagine two pendulums, as shown in Fig. 3 started, one a fraction of a second after the other. Assuming that their center is the same, it will easily be understood that the second pendulum may give the first pendulum a kick at some period of its swing, which assists in keeping up the oscillations of the first pendulum, maintaining them for a longer period, at the expense of the energy of the second pendulum. In terms of current passing in the spark, this means that the kick given by

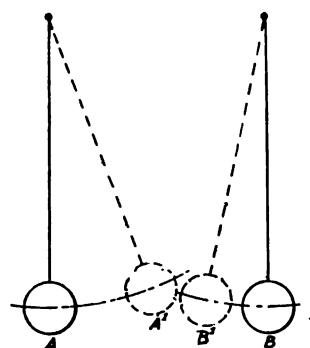


Fig. 3.—This illustrates the action of two pendulums, showing how one may give additional impulses to the other. When the pendulum A is at A, returning towards A, if pendulum B swings over and hits pendulum A, it gives A an additional impulse at the expense of its own energy.

the oscillations of the outside spark, go to keep up the oscillations of the inside spark, maintaining the inside spark for a longer period, producing a fatter spark and giving the charge a better chance of ignition. It will be remembered that with an engine running at 1200 revolutions per minute, the time of the spark is very small, and the time available for ignition is very small, and therefore what would appear an infinitesimal increase in the time during which the spark is in vigor may have an important bearing upon the firing of the charge. The firing of the charge depends upon the amount of heat delivered to it, and this again depends upon the duration and strength of the spark.

AN IMPORTANT QUALITY.

In addition to the above the outside spark may, and often does, prevent the failure of the inside spark by practically neutralizing the leakage path formed upon the surface of the insulating material between the platinum points and upon the platinum wires themselves. Motorists know to their sorrow that spark plugs get dirtied up. Soot is deposited upon the porcelain, upon the platinum, sometimes upon the platinum points themselves, and gradually a skin of soot is built up, bridging the spark gap, as shown in Fig. 4. In the absence of the outside spark this soot path will prevent the passage of the inside spark. As electrical engineers express it, the leakage path by way of the soot, will short circuit the spark gap. It will absorb all the energy that the coil has to give, ex-

cept under certain conditions. The conditions under which it will not do so, are when there is another spark gap in the circuit, and oscillating currents are set up. The sooty leakage path, almost forbids the passage of the oscillating currents which go to form the spark through it. It does not like them, and will not accommodate them, when they are set up by the presence of another spark in the circuit. Hence the presence of the outside spark, insisting as it does upon the formation of

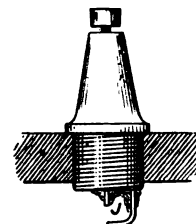


Fig. 4.—The diagram shows at J the stain of soot formed between the platinum, almost bridging the gap and short circuiting the spark.

an oscillating current, whenever the ignition outfit provides sufficient pressure, neutralizes the leakage path, and keeps the inside spark going.

A caution should be given here. There is a limit to the protection afforded by the outside spark, and therefore its presence should not lead to any failure to examine spark plugs, and keep them clean. The outside spark is simply one more chance for keeping things going, and keeping the engine running.

Tire Valve Derangements.

Most tire valve derangements are due to the rubber washer in the screw cap of the valve itself. The large thimble which envelopes the whole valve is not meant, but the little cap which must be screwed off before the pump can be applied to the valve. What occurs is this: When the valve cap is screwed home the rubber plug squeezes out of shape, and is more or less cut by the sharp edges of the valve, so that very small pieces of rubber are ground off it. These get into the valve, and before very long it commences to leak, when the only remedy is to let all the air out of the tire, take out the valve stem, remove the particles of rubber which have got into the valve, replace, and re-inflate—a laborious operation which no one willingly undertakes. To get rid of all this trouble it is only necessary to cut small hard leather discs which will just fit into the valve cap. The leather will not be cut by the screwing up of the valve cap, nor will it push into the valve as the rubber plug does. It is not necessary or desirable to remove the rubber plug in the valve cap, but merely to put the leather one on the top of it. The rubber gives a certain spring behind the leather, and is therefore beneficial.

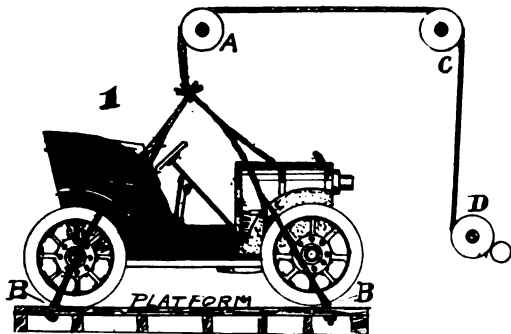
Sunshine and Dampness.

Sunshine has a deteriorating effect on rubber. On all occasions one should endeavor to store outer covers and inner tubes in dark places, and when out driving the same thoughtfulness bestowed on a horse, in leaving it in a shady spot when at rest, may with advantage be given to a motor car. Besides protection from light in the store-room, the question of ventilation and temperature should not be neglected. Both frost and heat injure rubber, and a temperature of between 60 and 70 deg. should be regarded as that at which it preserves best. Although dampness is by no means harmful to rubber alone, any which is lined with canvass should be guarded from it, otherwise the fabric will become rotten in time.

SOME TURNTABLES.

Various Devices That Have Answered a Crude Purpose.

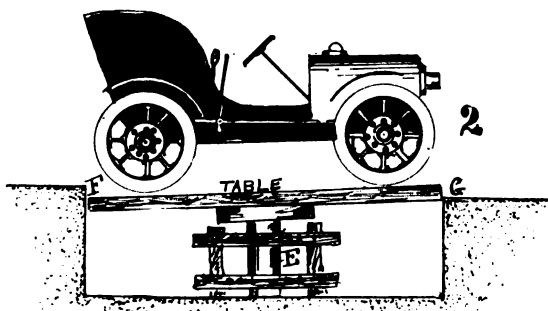
For years valuable motor-vehicles were pushed backwards and forwards in repair shops, garages, stables, storage and sales departments for the purpose of changing the position of the same. If it was necessary to turn the machine around, there was considerable hauling, talking, pulling and jolting. The body-



work of the car was often injured by bumping against something. Time was lost. Tempers were aroused. Within recent years men have endeavored to introduce better methods of turning a motor car about in a small space. There are experts at the steering wheel who like to show what they can do, and who undertake to turn a machine in a shop or garage within a small circle. Frequently an accident happens. Consequently there have been a number of different designs of turntables, elevating platforms, and revolting contrivances invented by ingenious men to perform this service.

One of the first devices observed by the writer is shown in Fig. 1. The manager of a repair shop had it made for the purpose of economizing space. It consisted of a platform built of planks, and properly braced below to make a strong support. Then four ropes, one from each corner, were attached and brought up to a common center above as shown. Then the single-strand passed over the grooved wheel A. From this point the rope extended to the hand windlass at D.

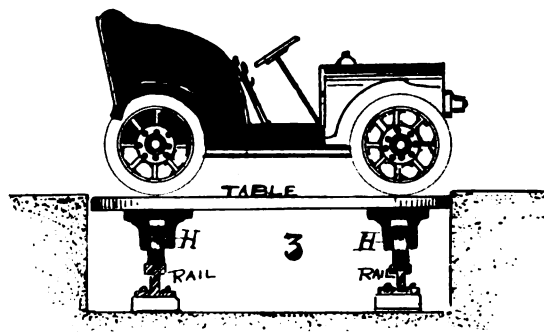
In case the workmen wished to turn a machine, it



was run quickly upon the platform. The men at the windlass turned the crank and the rope wound and elevated the platform with its car. A slight elevation enabled the platform to clear the floor so that the workmen could revolve the platform and bring the head of the automobile in its new direction. Then the platform was dropped and the car run off in its new direction. But there were numerous objections to this affair and many of the workmen preferred to guide the machine about to the new direction on the

main floor to bothering with the stubborn windlass and the gearing of the platform.

Then some one adopted an odd type of platform. A discarded piston elevator was used. The piston elevators for one story are extremely slow affairs, as we all know. The one referred to was of the old-style, bulky type, and was taken out for the dump heap. An inventive man saw the opportunity to utilize this platform of the elevator with its piston, for a turntable in a garage. Fig. 2 shows the result of the rigging which was put up. The floor of the place was excavated to a depth of four feet. The width and length was made to correspond with the size of the platform. A shabby bracing of timbers was installed with bearings for the piston as at E. The whole affair was crudely erected. Consequently when the cars were run on, the table soon lopped out of line. There was a depression at F and an elevation at G. The rickety table was used however. And the writer noticed various other forms of turntables. He saw tables manufactured by established turntable companies, some of which were of good design and exceedingly strong and useful. All are made to save time and trouble and should be used in shops, storage houses, sales departments, rental places and wherever it is necessary to turn the cars about very much. I saw turntables of good form for sale at \$250. Fig. 3 is a type of table of substantial build. It is much like the turn-



tables used by the railway companies for turning heavy engines and cars. The center support is not used. The weight is equally placed all over the table from the fact that the rails below receive the weight along the edges of the table. The sectional view shows the timbers laid on the foundation to support the rails. These rails form a smooth surface for the metal wheels in the brackets H, H. The brackets are bolted to the bottom of the turntable. There are sufficient numbers of these wheeled brackets to assure a steady support for the platform. Hence the platform of the turntable can be revolved on these wheels very readily. One side is always maintained at the same level as the other. There can be no tilting of the table. I have seen some home made types of tables like this. But most of them are installed by the builders who have every facility for constructing and installing such tables.

Exposed Oil Holes.

If a motorist decides to have the body and chassis of his car repainted, he will do well to see that all exposed oil holes are stuffed with felt or waste to prevent them becoming choked. Failure to observe this precaution will result in their becoming clogged with paint, which, if not removed before the car is placed in commission, will prevent oil reaching the bearings.

METAL PARTS.

Cleaning, Polishing and Lacquering—Methods and Formulas.

BY M. C. HILLOCK.

The automobile with plenty of brass furnishings, as many of them have, will give the painter a lot of hard work in bringing them up to a finish unless some quick, effective system is employed. The parts detached from the car may, of course, be dipped in some solution and therefore quickly cleaned. With the parts not detachable a different problem presents itself. A dip of two parts sulphuric acid and one part nitric acid, confined in a metal tank, is the medium used by brass cleaners and buffers for removing the lacquer and other substances from the brass preparatory to polishing it. To remove the tarnish from brass after taking off the lacquer in the sulphuric acid and nitric acid dip, immerse the brass in an oxalic acid dip, also in a metal tank, this bath consisting of 4 ounces of oxalic acid and 20 gallons of water. However, the average automobile painter will scarcely have enough brass fixtures to put into condition to warrant the elaborate system of acid dips referred to.

In the absence of these, take a pound of caustic soda in five gallons of water, and, wearing a rubber glove, wet up a ball of cloth, and wipe the solution of caustic soda upon the brass parts, taking care to keep it off the paint and varnish surface. Wet over a portion of the fixtures and then go back and rub the parts smartly until the old lacquer disappears, after which wet up the surface with oxalic acid and wipe dry, bringing the brass finally to a high polish by the use of some one of the numerous metal polishes. Where the fixtures are attached to the surface it is a good plan to finish the brass before applying the finishing coat of varnish.

Having fetched the brass to a dry, high, bright finish it should before being allowed to tarnish, which it will do soon under apparently the best of conditions, receive a coat of lacquer. This thin, transparent, and fairly water white material, may be procured ready to apply to the surface, and, on the whole, it is much cheaper than the lacquer shop prepared, and is much more durable. A substitute, in an emergency case, may be made of pale body finishing varnish thinned with turpentine to a mere wash state. Exceedingly thin white shellac may be used for the purpose when nothing better offers. Or take the ordinary white shellac cut thin with pure grain alcohol, or with a denatured alcohol containing not less than 95 per cent. pure grain alcohol, permit this to settle and decant.

Another transparent lacquer may be compounded 2 parts mastic, 2 parts amber, 5 parts sandarac, 5 parts white shellac and 50 parts grain alcohol.

However, as above stated, the lacquers for metals bought ready prepared for use are to be preferred.

Silver mounted, sterling silver, and all bright finished metal parts, barring pewter, alloys, etc., may be made to respond to the treatment above described.

To shop prepare a polish for the metal parts, mix 10 parts gilder's whiting, 5 parts rotten stone, pulverized, and 2 parts No. 00 pumice stone flower. Mix these dry mediums intimately, and use by moistening a soft cloth in water and dipping into the powder.

Another formula provides for the use of 4 ounces of fine calcium carbonate, or chalk, one ounce pipe-

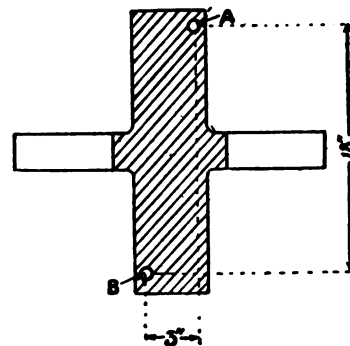
clay, one-half ounce rotten stone, and a quarter ounce each of magnesia carbonate and jeweler's rouge. Whip the dry ingredients intimately together and use as per the preceding formula.

In automobile repainting and finishing much depends upon bringing the metal parts up to a finish which harmonizes with that applied to the other parts of the car. The successful painter is one who turns out a well balanced finish, the metal parts always included.

FLY WHEELS.

Why They Should and Why They Do Not Always Balance.

At first sight it might seem that a flywheel must of necessity be in balance if it is round and symmetrical, and were it round, symmetrical, and also homogeneous it would, of course, be in balance, but as a matter of fact it is very seldom any one of these things. For instance, the average flywheel to-day is certainly round outside, but it often has fan blades cast in it, and these are not machined, but are just rough castings. Then even if it has no blades it may not be turned all over, and if it is without blades and turned all over it may be full of invisible blow-holes which will render the metal



Flywheel with blow holes.

anything but homogeneous. It is worth while, therefore, to consider how much the errors in this respect will affect the balance of the engine. Any data we assume will, of course, be of the nature of guesswork, but we shall not be far wrong if we say that the fan blades on one side of an 18-inch flywheel may easily, where roughly cast, weigh 1 lb. more than those on the other side. The radius of the fan blades will be about 8 inches, and at 1,000 revolutions this will represent a disturbing force on the clutch equal to the weight of very nearly 50 lbs.; at 2,000 revolutions it will increase to a force equal to the weight of 200 lbs. That is to say, the blades of a fan flywheel being 1 lb. out of equality, will have the same disturbing effect on the balance of the engine as would a single unbalanced cylinder of about 3 inch bore by 3 inch stroke—in other words, the effect would be very much like that produced by having a motor bicycle engine running on a car.

It will be noticed that this disturbing effect is produced by a weight of 1 lb. 8 inches out of center, and it would undoubtedly be possible to detect this by mounting the flywheel on a mandrel between lathe centers, but how much could be discovered in this way is very uncertain. Mounting the work on a mandrel resting on straight edges would be better, no doubt, but even this would be an inaccurate method. The rolling resistance of a flywheel on a mandrel rolling on level, straight edges will probably be nothing less than one-hundredth of the weight of the wheel, so that if the wheel weighs 150 lbs., the rolling resistance will amount to a tractive effort of

1½ lbs. applied to the center of the mandrel itself. Any lack of balance in the wheel will, of course, not be applied in this way, but by way of leverage, and if we take the mandrel as 1½ inch diameter and the diameter (or ¾ inch radius) and the radius of the unbalanced weight as 8 inches, we have the result that the smallest weight which will make its presence known in this way will be 2 ounces, which would produce a disturbing effect at 1,000 revolutions equal to a weight of 6 lbs., which would not be very serious, but at 2,000 revolutions the amount would rise to 24 lbs., which would certainly be noticeable.

Then, again, there is another form of lack of balance which no amount of balancing on straight edges or between centers would detect. It is possible that, owing to blow-holes, the wheel, though in perfect balance when standing still, is not symmetrical. Consider the illustration. This is a solid disc flywheel. Now suppose a blow-hole at A is balanced by another blow-hole at B, the wheel will be in perfect statical balance, but will not by any means balance when rotating. Let us say for the sake of argument that the amount of metal lost from each of these blow-holes is 1 lb., that the diameter of the flywheel is 18 inches, and that the horizontal distance of the holes A B apart is 3 inches. Then when the hole A reaches its highest point there will be a tendency to bend the tail of the crankshaft in the direction of the arrows equal to a weight of 50 lbs. acting at a radius of 1 foot, and one-thirtieth of a second later this tendency will be reversed. This would set up a quite unpleasant vibration, and it is a fault which could in no way be detected by statical balancing.

The only method by which such a fault could be found out and the best method of finding out any fault of balancing is to run the flywheel when it is free to vibrate, and then hold a pencil against its edge to detect wobbling. A machine for this purpose has recently been brought out where the flywheel or part to be balanced is mounted on top of a spike, so that it can vibrate freely, and is then spun up to one or two thousand revolutions per minute and marked by pencil, any error being corrected by drilling metal out of the wheel rim till it is in perfect balance. The distributing forces introduced by lack of balance in the respects mentioned are worth investigation on the part of designers.

Lack of Knowledge.

How little some people understand the automobile is told by H. C. Carter. A customer who had a Carter carburetor on his car complained that it was all wrong because the motor would not start and that he had gone back to the old-style carburetor. It was found that the trouble was wholly in the ignition, the cylinder being too large to be spun by the system he was using. The compression was so high it would not turn over. By adjusting the breaker points the motor was started instantly. In another case a chauffeur who complained of the carburetor was found to have wired his timer wrong, the spark being made on the exhaust stroke.

Filling the Radiator.

In filling the radiator it is a good plan to allow enough water to pass in to bring the level over the end of the vent pipe. If this pipe is clear, as it always should be, the fact will be indicated by the overflowing of the water through it. If it is not clear the water will overflow through the filter cap and not the vent pipe, and it should be attended to at once.

If your oil lamps go out frequently while running, it may be owing to the draught holes in the top being choked up by heavy deposits of carbon.

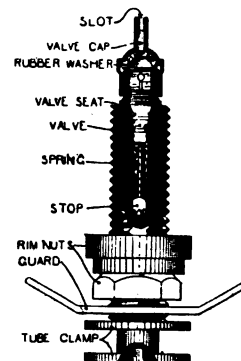
TEMPORARY TIRE REPAIRS.

How to Find Leaks and to Mend them Correctly.

Temporary repairs of pneumatic tires are not difficult to make. The most important requirement for success being care and the exercise of a little judgment. In case of a tire leak, first examine the valve to see if it may not be due to some defect here. Now the valve is not a complicated piece of machinery, by any means. But how few there really are who know just how it works. To ascertain whether the leak is due to a weak valve without taking off the tire turn the wheel so that the valve is at the top, when the valve stem will be hanging downward. Fill a glass of water, and hold it so that the valve stem projects into it. Air bubbles will show a leak due to the weakness of the valve.

The illustration shows the valve that is in almost universal use by American tire makers. The main part is a brass tube, threaded on the outside from end to end. The inner part of the tube is threaded at the upper end, and into it screws a small brass plug that forms the valve seat. A thin rod passes through a hole in it, and is made with a shoulder on which rests a piece of rubber that forms the valve. A spring under the shoulder presses the valve against the seat, the lower end of the spring resting on a stop.

When you force air into the tire, the rubber valve



Valve parts.

moves downward, the rod moving with it. When you stop pumping, the spring presses the rubber against its seat, preventing the escape of air. A heavy piece of rubber, oval in shape, called the "valve base," is attached to the bottom of the brass tube by the clamp, and is cemented to the inner tube. A brass cap screws to the top of the brass tube, to prevent dust and moisture from entering. A rubber washer inside the cap is squeezed down against the end of the tube, and prevents the escape of air that may pass the valve. The top of the cap is made with a slot, so that you can take off the cap, turn it upside down, stick it into the valve tube, and use it as a screwdriver to remove the valve parts. Unscrewing the seat removes all the parts. The parts cost very little, and in case of a leaky valve it is cheaper to renew all the parts rather than to try to fit a new rubber valve.

The simplest and quickest way to repair a puncture or small cut in a tube is to stick on a patch by means of rubber cement, and while this is not a permanent repair, a good job will last for a considerable time. The principal requirement is to have the rubber clean. The whitish surface of the tube is due to the sulphur that is used in the manufacture, and as the slightest trace of this will prevent the rubber cement from sticking, it must be carefully removed. Wash the space around the hole with gasoline, and rub vigorously with rough sandpaper. After repeated wash-

ings and rubbings, the surface will appear the color of the rubber and is ready for the cement.

The patch that is to be applied should be an inch larger than the hole on all sides—that is, the patch for a pin hole in the tube should be two inches in diameter. Patches in assorted sizes may be purchased from the tire makers, and are thick in the center. If a patch is to stick properly it is absolutely necessary for the edge to be thin. If this is understood, patches may be cut from an old inner tube, if necessary.

The rubber will cut more easily with a heavy pair of scissors than with a knife, and it will cut better if you wet the blades with water. Having cut the patch the proper size and shape, the edges must be beveled with the scissors, the bevel extending inward as far as possible. If the edges are not beveled, they



Patch badly fitted.

cannot be made to stick to the tube, and will curl up, as shown in the illustration.

Having prepared the patch, the side that is to go next to the tube must be cleaned as the tube was cleaned, and it will be seen that the sandpaper leaves the surface slightly rough. This will give the cement a good hold. Then apply a thin coat of cement to the tube, covering the surface beyond where the edge of the patch will come. Also put cement on the patch, and set the patch and tube away for a half-hour, to let the cement set. When it is thoroughly sticky, apply a second coat to the patch and tube, again letting it set. Care should be taken to have the coats very thin. When a third coat has set, the patch may be applied.

Lay the part of the tube that is to be patched on a flat surface, and beginning at one edge, roll the patch into position, so that the puncture is under its center. If the patch is laid on, air bubbles are likely to form under it, and will prevent a good job. When the patch is in position, it should be hammered down, to make good contact and to drive out any air that may be caught under it. Then put a flat piece of wood on the patch, with a weight on it, and leave it for as long as possible—one hour at the very least.

An even better method is to put pieces of wood above and below the tube at the patch, and squeeze it in a vise, the wood preventing the vise jaws from injuring the rubber.

A hole in a tire casing is serious only when it is big enough to let the inner tube blow through it. Usually this occurs with old tires, which have been in use so long that the rubber tread and side are worn off and the fabric weakened. In such a case no repair will be satisfactory. If there is a cut in a casing that is otherwise in good condition, a temporary repair may be made, and will stand many miles of running. Such a repair consists of attaching a patch of one or two thicknesses of heavy canvas to the inside of the shoe, and in addition a manchiion should be used. Material for this use may be bought from any of the tire makers. It is known as "friction cloth," and consists of heavy canvas with a dressing of rubber cement on either one or both sides. It may be bought either in rolls or in pieces of the proper size for patches; in either case the cement is covered with thin cloth to keep it from sticking, and this cloth must be stripped off before the patch is used.

The inside of the casing around the cut should be

scrubbed clean with gasoline, and, when it is thoroughly dry, a coat of cement should be applied. Cement should also be applied to the cemented side of the friction cloth, and the cement on the casing and patch should be permitted to set, as was the case in the repair of the inner tube. As before, apply three coats, and when the third has set, roll the patch into position inside the casing. It should extend several inches on each side of the cut, and should line the casing from bead to bead. It is often advisable to bring the edges over the bead, so that they will be caught between the beads and the rim when the casing is in position. The patch should be hammered down, using a hammer with a rounded end to bring the patch into close contact with the casing.

These repairs are only temporary, and will not hold under hard usage. Permanent repairs are made by vulcanizing only, for which simple apparatus is now made at a low cost.

OVERHEATING.

What Often Causes It and How It May Be Usually Remedied.

Quite a number of motorists are experiencing at this season of the year engine overheating; with it, loss of power and much anxiety, not certain what to blame or how to remedy apparently such a simple thing, considering that it has never happened before and that the car is of a very reputable make. In their haste to settle the cause in their own minds they pitch upon such conclusions as bad roads, bad weather, and so on, but still that does not remedy the heating. If the truth were known, perhaps one would be annoyed to find how simple the cause, due, perhaps, to wear, insufficient attention to detailed adjustment, or neglect of the proper use of oil.

First of all, dealing with the predominant water-cooled engine used in most prominent makes of cars, upon which we must not forget the manufacturer has spent much time and money testing under the severest conditions of road and weather use, and has in ninety-nine cases in a hundred found by experience the exact quantity of water, size of piping, rate of speed of pump, cooling surface of radiator and water jacket, speed of fan, if any, and proved all such quite efficient, working as a new, well-regulated automobile.

Now, what we have to consider, commencing with a machine, say, that has been run some time, one year or more. Perfect factory conditions have been changed, some cars have run all winter, using various anti-freezing solutions, which, although they have really no immediate injurious effects, will surely, unless one is very careful in their selection, corrode and clog to a certain extent, making the water circulation much slower than normally would or should be, this in itself giving much trouble. The only remedy will be to have the whole water course thoroughly cleaned. Another important point, if the car has a fan placed directly behind the radiator to induce a draught while on low speed and standing. Now this important factor, acting as so valuable an aid to cooling, while very accessible and so easily taken care of, is grossly neglected. The owner or chauffeur, when in the garage with the bonnet up, generally is content so long as the fan blades are seen to be moving at all and the belt intact, to leave well enough alone, as he considers that the fastening may break if too light. This may be so, but it is a good practice to always carry as part of the running equipment a spare

fan belt, cut and stretched to the required length, with a new fastening attached in case a break should occur rendering the belt too short. A flat belt does not require to be so tight as the round species. The V-shaped belt, fitting into a V-shaped pulley, should become more popular, as it is very positive in its action. All cars should be fitted with a variable adjustment, such as the eccentric or spring affords. Adjustment or no adjustment, the belt must be tight enough to perform its work efficiently. A good test is to suddenly stop the engine and watch the fan. When the motor rebounds on its compression the fan should do exactly the same, rocking back just a fraction of a turn. Passing on, but not forgetting the fan and its function of creating a draught, the air cooling the water passing through the radiator, and still another proof of its proper working, take off your hat—no matter of what style—and when the engine speed is well up to normal, car standing still, place it flat upon the face of the radiator, and it should not require any holding, the suction of air retaining it in position. With the engine running at the same speed with bonnet removed the current of air should be distinctly felt sitting in the driver's seat.

Next we take the pump, if any, from constant use being unable to get a very good share of lubricant, also being made of soft material, we find a considerable amount of wear, no matter if centrifugal or gear, both wear very fast, the centrifugal wearing on the sides of the blades, allowing the water to escape, instead of being forced direct ahead; the gear pump not meshing deep enough, with the same result, retarding the circulation. Both can be fixed by an intelligent chauffeur who understands fitting.

Now we can come down to lubrication of the cylinder, which, if not properly regulated as to quantity and quality, both of the very utmost important, will create heat from the abundant friction. The cylinder oil used must have the right amount of viscosity; in fact, one cannot attach too much importance to the procuring of oil put up expressly for the high-speed gas engine by a reliable firm. Far more care should be exercised in the selection of cylinder oil than gasoline.

Another point of importance about the carburetor and amount of gasoline consumed. The more gasoline used in each explosion the greater the heat generated. At this time of year the gasoline supply will likely have to be cut down to be consistent with the atmospheric conditions, but great care must be exercised in the alteration also, and one must not overlook the fact that the spark must be kept as high as possible, not forgetting that as time and wear go on more spark lever motion may be required to secure same position for explosion.

Regarding leaks from any part of the water circulation, these must be stopped, all and every one. All washers between joints should be examined to see that when the same are secured the original sized aperture still exists for the free passage of water. When rubber hosing is used, especially to make a short connection, such as from the radiator to the engine, very often part of the interior will become rucked up, partially obstructing the passage.

Many of my readers will say, "When am I to know when my engine is too hot?" to which there is one sure answer: when you begin to lose power, and, of course, when water boils in the radiator for more than a few minutes at a time in climbing on a very hot day some heavy, sandy hill, but if this continues under normal conditions it must be prevented.

TROUBLE DEPARTMENT.

Questions answered by the Y. M. C. A. Automobile School, 323 West 57th St., New York.

This department is intended to be a "trouble clearing house," and it will be esteemed a favor if our readers will add information to it from their own experience or knowledge.

Head Lights.

Question:—I enjoy reading THE AUTOMOBILE DEALER AND REPAIRER very much, and would like to have you answer the following question through the Trouble Department of the paper:

With the proper lamp in the head lights is it practical and economical to use dry cell batteries to supply current for them? If so, what kind of filament lamp, what voltage, and how many batteries would make the most economical outfit? How would the cost of the batteries compare with the cost of carbide for gas lamps? Will it injure dry cells to test them with a volt meter?

Answer:—Electric head lights have been successfully used, but they do not give as strong a light as acetylene gas and are much more expensive, although they are perhaps less troublesome where a storage battery is used. Dry cells are not practical for this work because they are not adapted to a continuous load. Six volt Tungsten lamps are the most economical and should be used in connection with five dry cells.

It will not injure dry cells to test them with a volt meter, but a better idea of the strength of a cell can be obtained by testing with an ammeter.

Probably Advanced Spark.

Question:—I have a little trouble with my car and I thought you might help me out if I told you about it. It is as follows: My car is running very good only when I have the spark far advanced and as soon as I go to advance the throttle, why she begins to knock. I have tried everything but can't strike the right place. My car is a 4-cylinder Cadillac, 30 horse power, so if you would kindly help me out I would be very much obliged for your kindness.

Answer:—From your description I should judge that the trouble lies simply in advancing the spark too far. However, if you find that you cannot advance the spark sufficiently to get the proper amount of power, I would suggest as a possible cause that there is carbon in the cylinders. This carbon comes from using too much oil, or from having the carburetor adjusted so that the mixture is too rich. In fact, the carbon will come in it even if everything is normal. To remove this carbon it will be necessary to take off the cylinders, using a screw driver, and with a small piece of tin about the size of a half dollar scrape the inside of the cylinders thoroughly. At the same time examine the connecting rods quite carefully to make sure that all of the bearings are properly adjusted. I trust that this will help you out of your difficulty.

Nine Queries Answered.

Question:—Being a reader of your journal I would like some information regarding 2 and 4 cylinder engines of equal H. P.

(1) Which will give best service where the roads are sandy and pulling continually hard?

(2) Which is the best running motor, vertical or horizontal, same H. P.?

(3) Will heavy pulling necessarily make engine smoke?

(4) Is an engine overloaded as long as it can propel car, or is it better to have a surplus of power where the pulling is heavy all the time?

(5) What is the average revolutions per minute that H. P. is estimated?

(6) What is the H. P. of $4\frac{1}{2} \times 5$ engine?

(7) What is the H. P. of 5×5 engine?

(8) What is the H. P. of $4\frac{3}{4} \times 4$ engine?

(9) How do steam and gas engine, same H. P., compare for hard service when roads are heavy?

Answer:—(1) As the application of power is more continuous in a four cylinder engine it should have an advantage over a two cylinder engine on very heavy roads.

(2) Vertical motors are more easily lubricated than horizontal motors, and give less trouble from loose bearings.

(3) Heavy pulling need not cause an engine to smoke, but as the engine is apt to become overheated under this condition and burn the lubricating oil, the general practice is to give an excess of oil in order to surely have a sufficiency, and it is this surplus of oil that works past the pistons into the combustion chamber and is burned, causing the smoke.

(4) A gas engine that can retain a normal speed is generally speaking not overloaded. It is better to have a surplus of power.

(5) H. P. is usually estimated at a 1000 ft. per minute piston speed; thus the revolutions per minute for a motor having a 4-inch stroke would be 1500 ft. per minute; 5-inch stroke would be 1200 ft. per minute; 6-inch stroke would be 1000 ft. per minute, etc.

The A. L. A. M. formula for obtaining approximate horse power of 4 cycle gas engines, which is being very widely used is

2.5

(6) Thus for a $4\frac{1}{2}$ -inch bore single cylinder engine 8.1 H. P.

(7) For a 5-inch bore single cylinder engine 10 H. P.

(8) For a $4\frac{3}{4}$ -inch bore single cylinder engine 9 H. P.

(9) A steam engine of equal H. P. would probably give better results than a gas engine on very bad roads, as a steam engine delivers practically full power at very low engine speeds, while a gas engine must turn over quite rapidly to deliver its full strength, and this makes gear shifting necessary.

A Mysterious Knock.

Question:—I have a Knox single cylinder runabout model C. There is a knock in the engine; seems to be in front by spark plug. I have had it all apart, the wrist pin is O. K., the crank shaft bearings are O. K., all bearings are new. I can set the carburetor so it will not knock by giving her more gas, but she won't pull up the hills on high gear, and if I set carburetor and give her more air, she will pull up all the hills not too steep fine, but she will knock awful. I cannot find what is doing it. I have retarded the spark and set it ahead, but it don't make any difference. I am sure it is something in the gasoline feed. Perhaps you can help me out. I have had a man who has had 10 years' experience with a Knox, and he cannot find out what causes the knock. We have overhauled the car, all bearings are O. K. and good and tight, and she runs fine but knocks, or won't pull up little hills when carburetor

is adjusted one way or other. Runs fine when gas is cut down in carburetor but knocks bad; and give her more gas in carburetor she won't knock, but she won't pull up little hills high gear. You may know what I can do to stop it.

Answer:—If, when you overhauled the engine you removed all of the carbon from the cylinder, are sure that it gets sufficient lubrication, and the spark is properly timed, it seems to me that you have covered nearly everything. A thorough examination of the cylinder for any very small projection that might become incandescent, may help to solve the problem.

Muffler Explosions.

Question:—I have a 1909 Cadillac "Thirty" car, which has run perfectly for 2,500 miles, but when on a heavy grade I open the throttle quite a little, I get frequent explosions in the muffler. This has been getting worse all the time, especially when I try to climb a hill on high gear without rushing at it and relying upon momentum. I would be greatly obliged to you if you would answer this in your Trouble Department.

Answer:—Explosions in the muffler are usually caused by faulty ignition. Examine the spark plugs and see that they are free from carbon and give a good spark. See if the points on the vibrators of the coils are pitted or dirty. They should be made perfectly smooth with a fine file and adjusted to a light tension. Clean the commutator out well with gasoline and add a little new oil. Test compression by cranking over motor, and if any cylinder is weak grind in exhaust valve. If explosions occur in the carburetor, the gasoline line may be clogged or a piece of lint caught in the spray nozzle.

Is your battery in good shape?

Breaking Crank Shafts.

Question:—I would appreciate any information you might be able to give me on the following question:

Would like to know the possible cause of a crank shaft breaking near the connection rod. The car is a 20 horse power two cylinder Moline. There have been two shafts broken on this car in less than a year, both in about the same place. The driver is a careful man.

Answer:—Advancing the spark too far would cause a crank shaft to break if the shaft did not have a large factor of safety. Carbon in the cylinders becoming incandescent and firing the charge out of time would put an excessive strain on the crank shaft. A very harsh clutch is also a possible cause for a broken crank shaft. The fact of two shafts breaking at the same place may be due to faulty designing, but it is more likely to be a mere coincidence.

Too Much Smoke.

Question:—I have a Winton Six, '09, 48 horse power, nearly new, but it gets out of fix and I did not build the thing, and it is difficult to get head or tail from the agencies. They are more interested in selling than taking care of the fellow after, but it don't pay to fuss. Why does my car go off smoking in the rear? These few lines are not for publication but a touch won't hurt. I am sending the sample where it will do the most good.

Answer:—Excessive smoking while sometimes due to a carburetor being adjusted for too much gasoline is more likely to occur from feeding too much lubricating oil to the cylinders. If an excess of oil is fed to the cylinders it will work by the piston into the combustion chamber and be burned. It is then exhausted through the muffler, which is usually located at the rear end of the machine, in the form of smoke.

Cam Shaft Timing.

Question:—I have a 10 horsepower Olds Motor. I have just had the cylinder rebored and new rings fitted to same. When I try to start the motor it kicks back with the spark lever at retard and throttle about $\frac{1}{4}$ open. It will probably make 3 or 4 revolutions before stopping. When I get it started it will run about 5 minutes, then stop with throttle open and spark advanced about half way. The carburetor is adjusted as near as I could adjust it, so the motor would run easy. Please let me know what the cause is and how to overcome it.

Answer:—Your trouble probably lies in the improper timing of the cam shaft. As this shaft operates both the exhaust valve and the spark timing device, an improper setting would cause both troubles. The spark should occur when the crank is on top dead center or a trifle past, and the exhaust valve should begin to open when the crank is 45 to 50 degrees before bottom center.

Give the Chauffeur Time to Work.

Many an owner may fear that by providing his driver with the proper means for effecting all ordinary running repairs, time may be wasted in the more or less desultory use of such tools, or, even worse still, that the man may be encouraged to tamper with the mechanism of the car for the mere sake of idle curiosity or the love of taking things to pieces to "see how they work." On the other hand, however, he is apt to forget that considerably more labor is involved in dismantling any of the important parts of a modern car than most drivers would feel disposed to expend "just for fun"; while only too many owners fail to observe that the chief weakness of their automobile tour is likely to be the lack of practical workshop experience on the part of their chauffeurs.

Remedy for a Coil Trouble.

If a coil gives trouble on the road it usually presents a more or less insurmountable difficulty. In one instance the driver traced a roadside trouble to the coil, and knowing that in some coils the plus terminal was internally directly connected with the bridge piece, he put a wire across between the bridge piece and positive terminal, and found that by these means the missing spark was restored. He accordingly maintained the wire in that position, and, in fact, has done so ever since, as he prefers an accessible external connection to an inaccessible internal one, however neat. The remedy may be fairly obvious, but then it is exactly the obvious that clever people are apt to overlook.

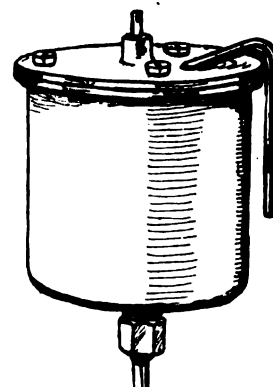
Beware of the Carbon.

When we consider that it is generally accepted in steam engineering that a coating $\frac{1}{4}$ inch thick on the inside of the boiler tubes necessitates an increase of about 60 per cent. in the heat supplied to produce the same amount of steam, the effect of excessive coatings of carbon on the walls of gasoline motor cylinders can be appreciated. The carbon prevents the heat from readily reaching the water jacket, and while at first it may tend to increase the power to an extent it eventually causes pre-ignition through retaining too great a proportion of the heat generated on the power strokes.

With the exception of those occasions when it is imperative to check the car as quickly as possible, the use of the brake should be dispensed with. Braking is greatly overdone by most drivers of cars.

If a Little Gasoline is Wanted.

Some cars have no vent tap for the gasoline system, so that when a little gasoline is wanted for cleaning purposes, such as cleaning a filter gauze or for priming the engine to secure an easy start, one can only get it by dipping some vessel into the tank or by opening a can of gasoline. Now the majority of cars have filled caps to the tank which are too small to enable gasoline to be withdrawn, and the simplest way to make it easy to get gasoline is to have a little tap fitted either in the base of the gasoline filter or in the gasoline pipe, the tap being so arranged that when it is turned off the handle is down, thus obviating the possibility of it shaking into the open position. Some cars have an overflow pipe to the float chamber. It consists of a small copper pipe, which is inserted in the cap of the float chamber, so that if the chamber floods the gasoline will run on to the ground, and not upset carburation, and this provides a ready means of obtaining a little gasoline, as one only has to lift or press the float needle as the case may be, when gasoline will run from the over-



Pipe at the lid of the float chamber.

flow pipe. If a pipe is not fitted it is perfectly easy to have one put on, and it can be done by any tin-smith without disturbing the piping. As we have said, some carburetors have such an overflow pipe, and we give a sketch to show what we mean, which also serves to show how easily a similar pipe can be fitted to the lid of practically any float chamber. If no vessel be handy into which the gasoline can be drawn from the float, one can always turn to the screw lid of the filling orifice of the radiator and use that as a makeshift cup into which a small quantity of gasoline can be drawn.

Keep the Radiator Clean.

The importance of keeping the radiator of a car clean cannot be over-emphasized. Sediment, inside, reduces the conductivity and makes the radiator as a whole less efficient. Mud in the air tubes or between the flanges tends to reduce the cooling surface and therefore to have the same effect in a smaller degree as does sediment.

A Door Squeak.

An annoying squeak which is often very difficult to locate is occasionally caused by the edge of the doors rubbing against their pillars. This rubbing is brought about by a slight sagging of the body in the center, and may be remedied by placing a leather washer of the required thickness around the body bolt, between the body and the frame.



The Oil for Every Car

The cost of maintaining your automobile and the amount of service it gives you depends to a great extent on the use of the proper oil. No matter what the make of your car, its type or purpose, the right grade of Vacuum MOBILOIL will give it perfect lubrication at all times and under all conditions.

VACUUM MOBILOIL

is made in six different grades. One of these grades is prepared especially for the perfect lubrication of your car. By the use of this one grade you will save time and trouble and avoid expensive experiment.

Send for booklet listing every automobile made and the grade of MOBILOIL prepared for it. Thereafter you need only watch the label on the can: the car will take care of itself. The book is free; its facts on the science of lubrication are invaluable. Gives track records to date, and other potent motor pointers. MOBILOIL, in barrels and in cans with patent pouring spout, is sold by dealers everywhere. Manufactured by

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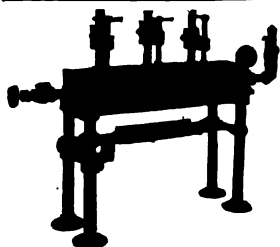
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WISHART-BURGE MACHINE WORKS,

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Retreading Tires.

The Fisk Rubber Co., of Chicopee Falls, Mass., says that 90 per cent. of the old tires which are retreaded should not be, if the interest of the owner alone is consulted. This firm says the manufacturer of rubber and the repairing of tires is a science that takes years to master, yet apprentices work a few weeks in a garage or tire repair shop, and thinking they know it all, branch out in business for themselves. Some of them will undertake to retread any old wornout shoe that is brought to them, for if they were conscientious and advised a customer that the repair would not be worth while, they would starve.

An owner may have a casing that has given him a few thousand miles of good service and is still apparently in good condition. He consults the manufacturers of that tire in regard to having it retreaded and they advise against it on the grounds that the inner fabric is too wornout and affirm that a new tire would be more economical. We have known of cases where the motorist, unheeding the advice, has gone elsewhere and repairmen have informed the visitor that the tire company is all wrong. As a result often only the poorest, cheapest quality of scrap heap rubber is used and the crudest methods employed. Should the old, played-out, re-treaded tire last only a week or so, due to improper vul-

canization and curing, the motorist has no redress from the repair man, who does not guarantee his work and coolly tells the owner his tire "was no good in the first place." The unscrupulous repair man has no reputation to lose and is not greatly worried.

The great essential point in the life of a tire is proper inflation. Users of tires who have driven them 5,000 miles or more properly inflated, frequently bring them back to the makers for re-treading and a serviceable, efficient re-covering is possible and the tire may be good for a few thousand miles more. But if a tire has not been driven at the proper degree of inflation, it is almost certain that the fabric has been strained so that re-covering is useless. In view of the fact that to vulcanize and cure a tire requires 55 minutes of heating at a temperature of 55 degrees Centigrade, it is easy to understand that this process is going to weaken fabric that has already been strained. A real expert knows what to advise in this case, and the advice he gives is worthy of careful consideration by users of tires.

Tire manufacturers as a class are honest with their customers. If a tire can be re-treaded and give so many hundred miles additional riding, it speaks well for the manufacturer's product and he is glad to be able to do it. When a manufacturer advises against it, however, it is the best plan to take his word and buy a new shoe.

Cuts in Tire Covers.

To find the depth of a cut in a tire cover, it must be sounded the same way as a doctor probes a wound. To do that, insert, very delicately, the end of some thin pointed object—not too sharp, else the trouble will only be aggravated. If there is nothing better to hand, a blunt pen-knife will do. If the wound is not more than a quarter of an inch deep in an ordinary cover, there is no danger. But if the cut is any deeper the canvas will have been affected. Remember that a tire should not be left in this state for very long before being repaired.

Very often, this probing or sounding will reveal the presence in the cut of small stones, or other injurious foreign bodies which have been picked up. We cannot impress drivers too strongly with the importance of locating these and removing them.

That a small stone should have lodged in a cut appears, at first sight, to be a matter of little significance. But when the wheel is moving, that small stone will begin quietly to work its way further into the rubber. It will rub the canvas and, slowly but surely, will eventually pierce it. Finally, it will work its way right through the whole thickness of the cover. Without the slightest doubt, then, it is absolutely necessary to examine your covers most minutely after a run.

Probe every cut carefully, and, even as a doctor cleanses a wound of every particle of injurious matter, so you should remove every foreign body that has embedded itself in the cut. By doing this you will certainly lengthen the life of your covers very considerably.

Use Rain Water.

Rain water is better than hard spring water for filling the radiator. A constant deposit is being made in water jackets and radiators by the mineral elements in spring water, from which the water of the rain barrel and cistern have been freed.

Reaming Out Gasoline Jets.

Comparatively few know the correct method of reaming out gasoline jets when the size of the orifice has to be increased. Even in the testing shop a certain sized watchmaker's reamer is pushed in from the bottom side of the jet, the hole being enlarged by rotating the jet or the reamer while steady pressure is put on the end. By practice the amount which the reamer should protrude through the top of the jet is known, and this amount is usually measured with a rule.

The reamer being tapered, the hole it makes is likewise tapered, and has a larger diameter at the lower than the upper part of the orifice. Hence if any grit or foreign matter should pass from the float chamber to the jet it may be large enough to enter the lower part of the hole but too large to pass out at the top. The suction of the engine has the effect of making the obstruction more solid, and it is then necessary to take out the jet and clear it. If the reamer be worked from the top side of the jet then the largest part of the hole is formed at the top, and if any obstruction should pass into the lower or smaller part of the hole it can pass right through the orifice and so give no trouble.

Rope Side Brakes.

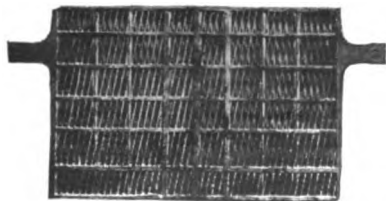
If side brakes are actuated by a wire rope, keep a lookout at the places where the wire rounds a bend, or anywhere where it is liable to chafe. These wires, after a strand or two has gone, soon go altogether, and a roadside repair is not particularly easy.

When The Car Is Stopped.

After bringing the car to a stop the change-gear lever should always be brought back to its neutral position. This removes the possibility of trying to start the engine and suddenly pulling the car on to you.

NEW STORAGE BATTERY REPAIR PLATE.

In many repair shops, where batteries of every size and make are constantly being rebuilt or repaired and fitted with new plates, either entirely or in part, it is almost impossible to repaste the old grids on account of their condition, the labor, delay and uncertainty involved. The ordinary plate when cut does not present a closed edge, and allows the active material to fall out, and the jar ribs to cut into the bottom of the plates, thus lessening the mud space, and causing trouble. With the new "Handy repair" plate, patent applied for, no less than 48 different sized plates can be cut, leaving each plate with a perfectly closed edge to retain the active material. This is accomplished by sawing

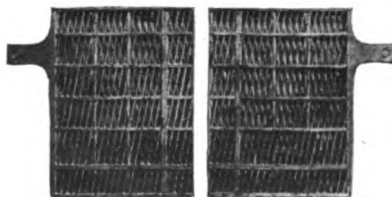


Handy repair plate.

the plate through the intersections cast into it. The cutting ribs being just wide enough to permit the passage of a saw through their center, allowing a safe edge standing on both sides of the cut. The

edges of the plate being made sufficiently heavy to permit of the attachment of the lugs which can be furnished separately if desired.

The grids are made in hollow cage form



How it may be cut.

properly proportioned, well designed, and readily retaining the active material, which is of a thoroughly tried and proven character, the plates being 7-32 thick, and adaptable when cut to such batteries as the Exide, Helios, Witherbee, Rex and almost all other well known makes. The plates sell at a nominal price.

These plates fill a long felt want, and obviate the necessity of having many on hand. With a small stock of the "Handy" plates, there is no waiting for parts, and quicker service can be rendered the customer who might otherwise throw the old battery in the scrap. The price also allows very rapid and low priced repairs to be made. The "Handy" repair plate for storage Batteries is manufactured and sold by

the Electrical Maintenance & Repair Co., Sunday Call Building, Newark, N. J.

RED HEAD TRADE MARK.

THE unique trade-mark design adopted by the Emil Grossman Company of New York, Red Head Spark Plugs, has been registered in the United States Patent Office. They were granted the words "Red Head" and the fac-simile of the boy mascot, whose familiar grin adorns the advertisement of this progressive company.

The sale of this ignition appliance, we understand has grown with almost giant strides in the past few months. Over a



Registered U. S. Patent Office.

hundred jobbers throughout the United States are handling these plugs, with large numbers of men on the road pushing their sale. Thousands of retail dealers in all parts of the country are co-operating.

MENDENHALL'S ROAD MAPS

MAPS AND GUIDES FOR AUTOMOBILISTS.

SEND FOR CATALOGUE.
C. S. MENDENHALL, PUB.,
39 Opera Pl., Cincinnati, O.

E. W. CARTER, who has for some time been in charge of the Boston office of the Hoyt Electrical Instrument Works, will hereafter be connected with the Factory at Penacook, N. H. A. K. Brown will succeed Mr. Carter in the Boston office. We understand Mr. Brown is well equipped for his new position.

RED RIB.—The accessory jobbers and dealers have expressed themselves as pleased that "Red Rib," concerning which a running fire of questions has appeared in trade journals during the past few weeks, turned out to be a high grade American manufactured ignition wire listed at popular prices. It has also been a matter of general satisfaction that the marketing of "Red Rib" is in the hands of the National Sales Corporation of New York City. This organization never places an article on the market that it does not first investigate its merits—such for instance as the "Red Head Spark Plug" and the "Hydraulic Wind Shield." "Red Rib" cable is made with both runner and braided insulation, primary and secondary and all other intermediate sizes for automobile and marine engine use. The rubber and covered cable is listed at a uniform price. It is the intention of the manufacturers, we learn, to simplify the cable business, similar to what was done with the "Red Head" spark plugs. This cable had to undergo a series of crucial and mechanical tests under the trained eyes of ignition experts before receiving the approval of the manufacturers.

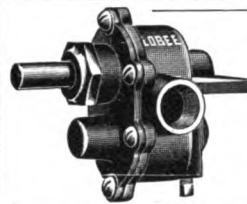
TIRE CHAINS.—There is no gainsaying the necessity for tire chains as a practical assurance against accidents, but as a matter of course, much nonsense has been circulated in connection with this device. The Whittaker Chain Tread Co. of Boston, Mass., are producing a tire chain grip standard in every way we are informed, using cross chains of special hard steel wire, hand welded. Chain and hooks are copper plated. The Whittaker people are now in their new factory, we understand, and have added a line of tire chain adjusters, and have developed the business in a commercial way and removed it, they claim, from the standpoint of a mere fad. But consult their advertisement on another page, and write for further particulars and prices, mentioning the AUTOMOBILE DEALER AND REPAIRER.

THE HERCULES PORTABLE CRANE.—For automobile builders and garages this crane is regarded by many of those who have used it as indispensable. One man with this crane can lift an engine or any portion of an automobile with ease. Further particulars can be obtained by writing to the manufacturer, Wm. S. Nicholls, Hooisic Falls, N. Y.

AIR COOLING TIRE PROTECTOR.—In this issue for the first time the Queen Mfg. Co., Lock Box 204, Webster City, Iowa, have an announcement of their "A S B" Treads. By the use of these treads, they say punctures and skidding will be avoided as well as blowouts, stone bruises and all fear of rutty roads. They further say that when your auto is equipped with A S B treads on all four wheels, that your



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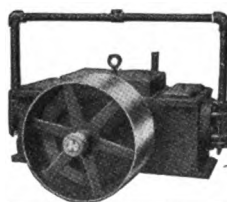
If you want good circulation on your automobile, launch or motorboat, use a
LOBEE PUMP
LOBEE PUMP AND MACHINERY CO.
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4X4 AIR COOLED MOTORS



\$80.00 each for Oct. only
Transmissions,
\$23.00 each.
Write for Catalogue.

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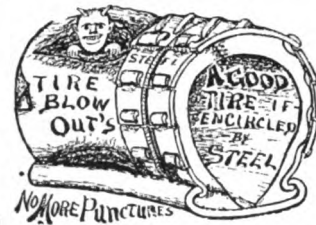


AIR COMPRESSORS
Patented
WATER-COOLED GARAGE COMPRESSOR
Weight 300 lbs., a real machine, not a toy.
Also other sizes.
Send for Descriptive Circular and Price List
Geo. S. Comstock
Mechanicsburg, Pa.

tire troubles will be over. They are making a special inducement just now on these treads, and they want every reader interested to write them at once for particulars concerning this special offer. This special offer is made so that a set of their treads may be introduced into every town and city in the country. They guarantee them. But consult their advertisement and write at once, if you are interested. They company does not seem to have a very high opinion of the advertising value of the Automobile Dealer and Repairer, but we are inclined to think that they will get a different impression after they have heard from our subscribers.

THE Swinehart Clincher Tire & Rubber Co., Akron, Ohio, announce the following officers selected at the stockholders' meeting: President, J. A. Swinehart; Vice-President and General Manager, W. W. Wuchter; Secy, C. O. Baughman; Treas. R. A. May. President Swinehart will devote his time to the company's European interests. Mr. Wuchter, who has been superintendent of the Firestone Tire and Rubber Company, will assume the active management of the Swinehart Clincher Tire & Rubber Co. It is the intention of the company to eventually embark in the manufacture of a pneumatic tire now being developed. For some time past the demand for their solid tires has exceeded their capacity to fill orders but immediate steps are being taken to improve their equipment and enlarge their capacity.

PROTECT YOUR NEW TIRES. REPAIR THE OLD ONES.

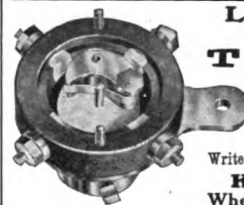


Tires Will Last Forever

Steel Link Bands

Hooks to Rim

You can fix Blowout quick. If tire is completely covered by these clasps you cannot have Blowouts, Punctures, Rim Cuts or Wearing off of tire. (Any old tire is good. How can it get away if encircled by steel?) As flexible as ever. Anti Skid.
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Agency for Indiana, 417 Mass Ave., Indianapolis.



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Manufacturers of
TIMERS
BUICK SPECIALS
Mica and Porcelain
SPARK PLUGS
Built for Service
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When You Buy, Buy the Best

CAST IRON BRAZING easy with UNIVERSAL FLUXINE

You can solder cracked water jackets easy with
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Will Make That Repair Job **SURE.**
Are you getting our pretty Monthly Calendars?
THE PACKARD ELECTRIC CO., Warren, Ohio.

"Kulpe" Pat. Steel }
Ball Bearings. Brass } Balls.

1/2 Inch Shaft and Up.
No Fitting. Just Push Them On.
10 Cents in Stamps for Sample.

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THE CLIMAX AIR COOLED MOTORS

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Guaranteed forever against defective material and workmanship.
Let us tell you all about them.
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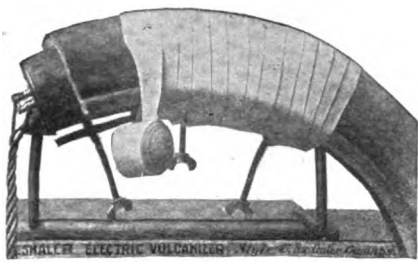
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To Do Certain Kinds of Work That No Other Vulcanizer Can Do. We have been making The SHALER ELECTRIC VULCANIZERS for only two years, and at the present time over half the Garages in the United States are using them.

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Descriptive Matter

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"Akron" Repair Kit

Makes the repair permanent, as it produces the same effect as vulcanization. The acid cures the cement to the rubber or part to be repaired, which makes it one solid piece of rubber and impossible to separate.



"Akron" Repair Kit
Price, Delivered, \$1.00

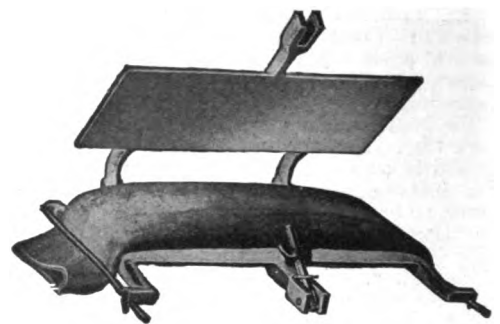
This Pure Aluminum Vise is intended to be used in applying patches to inner tubes. It holds the patches firmly in place while the rubber cement is setting and vulcanizing.

It prevents the patch edges from curling and positively assures you of a permanent repair to your inner tube. For use with any size inner tube. Small, light and strong. An absolute necessity for every automobile owner.

We also make the

"Akron" Inside Repair Patch,
"Akron" Tire Boot,
Motor Cycle Boots and Patches,
Top Dressing for Autos.

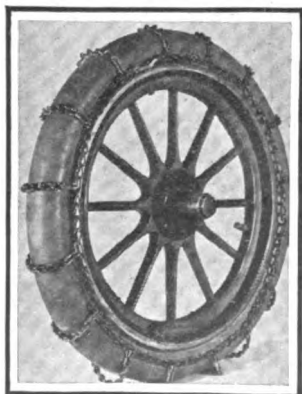
Ask your dealer, or write direct. We make regular inner tube patches, six sizes.



"Hold Tight" Aluminum Vise
For Inner Tube Patching,
Price, Delivered, \$1.25

THE EMPIRE MANUFACTURING COMPANY, 20 Beech St., Akron, Ohio

The Whittaker are The Standard



Price and Quality Right

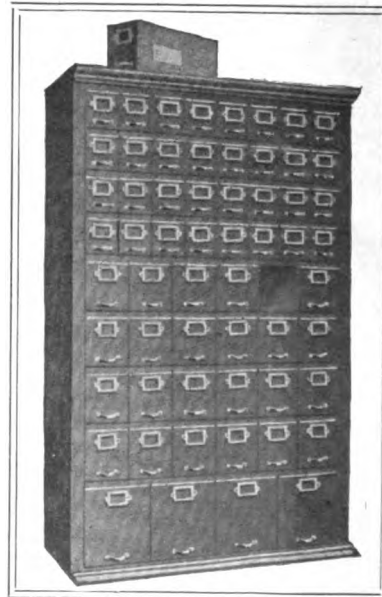
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No. 1761. Containing 60 Steel Dust Proof Drawers



This case has also a steel back and will keep contents in same condition as in original packages. Each drawer is fitted with a strong pull and card frame. Just the case you have been looking for to keep your small supplies in.

Size of case:
25½ wide,
11½ deep,
45 high.

Sizes of drawers:
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4x4x10,
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Finely finished in a Solid Oak Golden Oak Finish.

Price, \$18.00 Net.

Shipments made same day as ordered.

Send for prices and cuts of 25 other sizes.

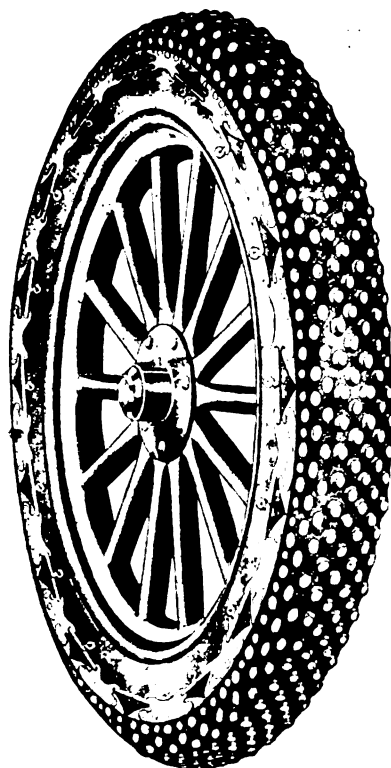
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Automobile Tires Will Last for 25,000 to 50,000 Miles When Used With WOODWORTH TREADS



And at the same time will be protected from punctures and skidding.

This means a reduction of 50% in the tire bill and the elimination of tire troubles.

A user of the Treads on the rough roads of Texas writes:—"My machine has never been run without WOODWORTH TREADS. It has been run between twenty and twenty-five thousand miles and I have never seen an inner tube of this machine." We have hundreds of similar letters from all parts of the country.

WOODWORTH TREADS are tire protectors made of chrome leather studded with large thick head steel rivets held on the tires by steel rings on each side.

They can be easily fitted to any make of tire without taking the tire off the rim.

Anyone can apply them.

They cost only about one-half as much as tires. The average life of the treads is about 3000 to 5000 miles.

The 1910 treads are now ready. They have a new adjustment extremely simple, strong, and quick to adjust. The leather is treated by a new process, making it very durable and extremely flexible so that the treads do not affect the resiliency or speed of the tire.

In addition to the thick-head rivets in the middle they have flat-head rivets on the sides to protect the leather from wear or injury in ruts or rough roads.

WOODWORTH TREADS have been in the market for five years. Over 50,000 have been sold.

The Woodworth patents cover the only practical means yet devised for making a protector that will not heat or chafe the tire.

They are sold with a guarantee of satisfaction or money refunded. Try them 30 days and if not satisfied you may return them and get your money back. If you are rated in Dun's or Bradstreet's you may try them 30 days before paying for them.

Write for catalog and copies of letters from users.

LEATHER TIRE GOODS CO., Niagara Falls, N. Y.

Repair Materials That Do the Business

Repair men who are wise know that they can get better results with Goodyear Repair Materials than any others made. When you once make a repair with Goodyear material for a customer you have made a friend out of that customer.

He will be so pleased at the way the repair looks, the way it holds up, the way it saves his tire for him, that he will always come a long distance to reach your shop when he needs more work.

He will say to his friends: "See the good job I had done at So-and-So's repair shop. That's where you want to go if you ever need any repairs. Because So-and-So uses Goodyear Repair Materials and I know they're right."

And the reason Goodyear Repair Materials are always bound to be right is because only the highest grade of stock goes into them—instead of odds-and-ends and reclaimed stock.

Only the finest of pure Para Rubber and the strongest Sea Island fabric are used in Goodyear Repair Materials, just the same as Goodyear Tires.

If you have never used Goodyear Repair Materials, send for a book of sample sections. Just look, for instance, at our G-50 retreading stock, at a medium price.

This G-50 is about the most popular thing we have. Repair men are strong for it, saying it gives fine satisfac-

tion. It makes a particularly smooth and good looking repair, and wears great, too. It makes the kind of repair that a repair man can get a good price for, and is justified in doing it.

Our G-90 is a striking proposition. Note that this stock has one surface of cured rubber and the other of raw gum.

This can't be beaten for use inside an inner tube, where a large split or blowout has occurred. The cured black surface unflinchingly keeps the stock from ticking to the other side of the tube when the cure is being made.

Our H. F. 81 Heavy Frictioned Fabric is equalled in no other line of repair materials, either as to quality of the fabric—best Sea Island—or the frictioned surface. It is giving excellent satisfaction nearly everywhere already.

Goodyear Bailey Tread Bands are semi-cured bands of high-grade tread stock with a surface of Bailey Buttons. They are endless and circular and make a wonderful retread.

Goodyear Air Bags for curing purposes and valve patches that really patch are among other notable features.

Send for samples now and examine the different stocks. Try out any of this line and then you will know why it will make more business, more money for you. Better send to-day before you forget.



The Goodyear Tire & Rubber Co., Sprague St., Akron, O.

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Under this head will be printed advertisements of shops for sale or to rent, or shops wanted, or situations or help wanted, or tools or machines (second-hand) wanted or to exchange, at the uniform price of two cents a word, which will include the address, for each insertion, payable in advance. No advertisement will be inserted for less than 30 cents, however small.

Remittances can be made in postage stamps if more convenient. Address, **MOTOR VEHICLE PUBLISHING CO., 24 MURRAY STREET, NEW YORK.**

COMMERCIAL MOTOR VEHICLES—Read the "Power Wagon" for reliable information concerning motor trucks, motor buses, motor cabs and other machines employed for business purposes. Issued monthly; single copies, 10 cents; \$1 a year. The most valuable paper of its kind published. The Power Wagon, Metropolitan Block, Chicago.

TOPS—Until further notice, runabout tops \$20, touring car tops \$35. C. G. Meyer & Son, Tiffin, Ohio.

CONCERN manufacturing automobile accessories is open to considering the manufacture of any specialty on royalty or otherwise. Address Box 2153, Boston, Mass.

TWENTY h. p. runabout; A1 shape; price 'way down; demonstration. C. L. Jones, Haskell, N. J.

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AUTOMOBILE CYLINDERS WELDED. We weld anything in metals, iron, steel, copper, brass, aluminum and cast iron. We pay the freight. J. C. Wilson Co., Cass and Adams Avenues, Detroit, Mich.

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"STEAM, Steam, Steam, That's The Stuff"—All Steam Car Owners should subscribe for the "Steam Motor Journal" a 28 page illustrated monthly devoted exclusively to the interests of the steam propelled automobile. \$1.00 per year, sample copy 15 cents. Chas. D. Sherman, 212 Orchard Road, New Haven, Conn.

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\$1000.00 BUYS A BUICK, 4-CYLINDER SLIDING GEAR, five passenger car in A No. 1 condition. Motor and transmission used less than one year. Fully equipped with four new tires, mohair top, slip cover, robe rail, foot rail, tire holder and case, Warner Autometer, Prest-O-Lite tank, lamp covers, chains, extra tire and trunk rack. Can inspect car at any time, or will send photograph. H. Jay Hayes, Hayes Mfg. Co., Detroit, Mich.

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Size	Case	Tube	Size	Case	Tube
28x2½	\$8.50	\$2.40	34x3½	\$18.00	\$4.00
28x3	10.50	2.75	30x4	19.80	4.20
30x3	11.50	3.00	32x4	21.00	4.50
30x3½	15.50	3.60	34x4	22.60	4.80
32x3½	17.00	3.90	34x4½	28.00	5.50

Also a few guaranteed cases 30x3, \$12.80; 30x3½, \$18.85; 32x3½, \$20.05; single tube tires 28x2½, \$9; 28x2½, \$10; 28x3, \$12. I ship. Pay for tires after examination. Wm. Vanderpool, Springfield, O.

\$400 FOR THREE SEATER AUTOMOBILE—First-class order. Good for passengers or freight service. Address Auto, 53 Plunkett St., Pittsfield, Mass.

BARGAIN PRICES. **FOR SALE**—Shelby 1½ and 1¼ tubing, less than manufacturers' prices; steel shafting, 1-in., \$2.20 per 100 lbs.; battery boxes, \$1.93; spring clips, \$1.87 and \$2.25 doz.; Bell cranks, \$8.40 hundred; step irons, \$12.25 and \$13.12 hundred; starting cranks, \$1.10 each; yoke ends, per hundred, No. 0, \$3.65, No. 2 \$4.20; No. 3, \$5.60; 12 7-passenger wood bodies \$27.50 each. Write for prices on other bargains. Detailed description on application. Dolson Auto Supply Co., Muncie, Ind.

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Eastern Self-Measuring Pump

Our 1907 Model, shown herewith, will quickly pay for itself in any garage.

**Convenience,
Economy,
Safety.**

Not one drop of Gasoline wasted.

**Gasoline Tanks,
Pumps,
Complete
Storage
Outfits.**

Get full information by writing to

**Eastern Oil Tank Co.
Lowell, Mass., U. S. A.**

**PUNCTURE PROOF!**

THE "INNER SHU"

Positively Makes



Makes Tires Last Twice as Long

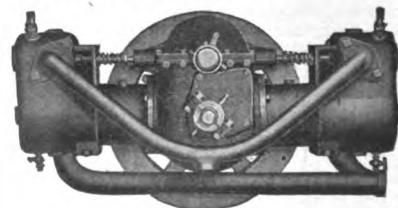
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INNER SHOE TIRE CO., Grand Rapids, Mich.

The Beilfuss Double Opposed Motor

Makes a hit wherever used on account of its compactness.

Can be placed in any car from the small Olds Runabout to the larger sized cars.



Made in two sizes:
10-12 H. P. and 18-20 H. P.
Water Cooled.

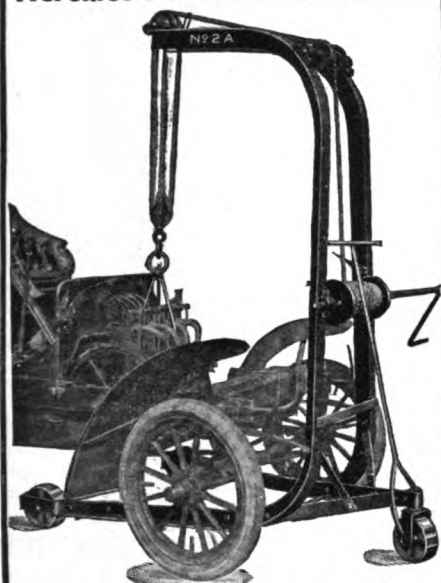
Write to day for Circular and Prices.
Simplest and Strongest Motor Built.

**Beilfuss Motor Co.
LANSING, MICH.**

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Hercules Portable Crane Hoist

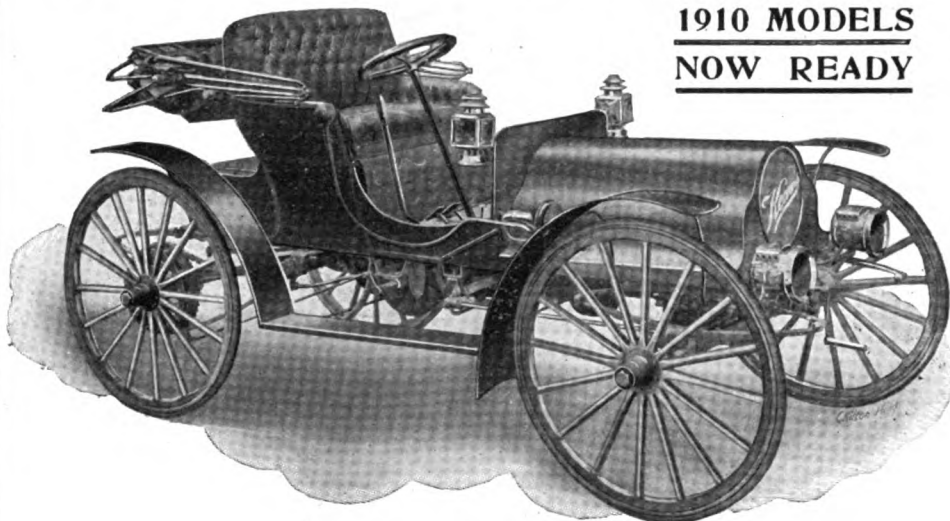


Patented December 19, 1905
See how easy it does it. Fills the bill for Automobile Factory and Garage Crane. Many of them using it. You should. Send for descriptive circular.
WILLIAM S. NICHOLLS, Hoosic Falls, N. Y.



FAR AHEAD OF ALL OTHERS.

**1910 MODELS
NOW READY**



KEARNS MODEL L.

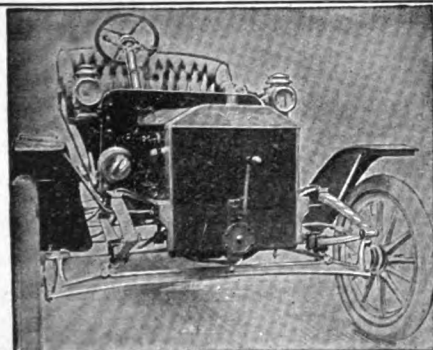
Gearless, Clutchless, Valveless.

18 horse power, 3 cylinder, 2 cycle, valveless, air-cooled.
Friction Transmission, Chain Drive to each Rear Wheel.

Transo-Differential Gear, a new "fool-proof" device, and the most simple and durable yet invented for the purpose.

Send for catalogue No. 10.

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Shumard's Front Spring Outfit for Ford Cars.

Patents Pending.

The most decided improvement ever made on a finished car of standard manufacture.

The difference in the riding and operating qualities is noticeable at once, and the surprise is a delight.

The safety of the outfit over the single spring cannot be figured in dollars and cents.

The greatly improved appearance is striking and produces favorable comment.
HUNDREDS ALREADY SOLD.

Brackets and perches are now made of Vanadium steel with a tensile strength of more than 140,000 lbs.

Springs are the finest quality, tempered in oil, and carefully tested.

Finished, painted and carefully packed in wood box.

Liberal discount to legitimate dealers. Write for further particulars and price to
THE SPECIAL MOTOR VEHICLE CO., Cincinnati, Ohio.

Don't Worry Over Tire Cost

Protect Your Shoes and Purse with
DAVIS ARMOR

Write for Art Booklet

Davis Robe Co.

1306 Champlain Bldg.
Chicago, Ill.



95 Per Cent. DELIVERY GUARANTEE.

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We can furnish you with the most reliable mailing lists of the automobile trade on the market. Do you need the **BEST DEALERS' LIST**? Do you want to reach the individual **OWNER**? Do you want **MOTOR BOAT OR MOTOR CYCLE Lists**? **WE HAVE THEM.**

DON'T WASTE YOUR MONEY ON POOR LISTS.

Our lists are neatly typewritten, and bound separately according to states or cities. We give you a 95% delivery guarantee, which means that we will refund the postage on any returned letters over 5% due to errors in our lists.

Postal us for Prices and Further Information.

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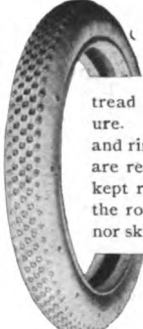
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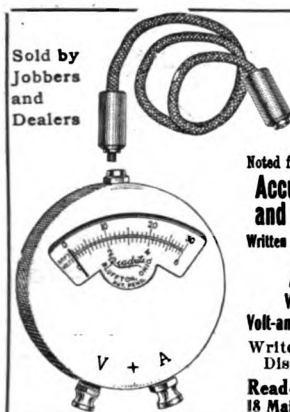
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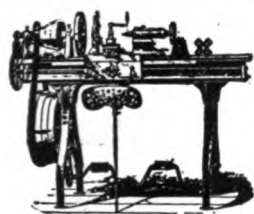
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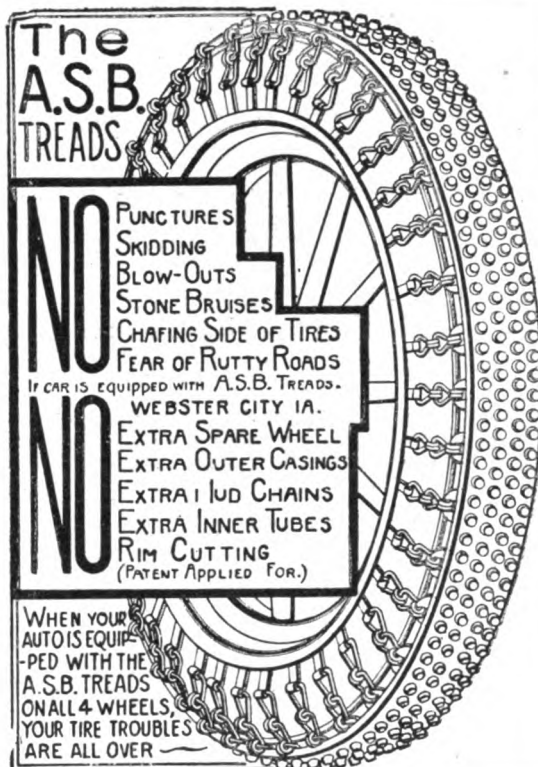
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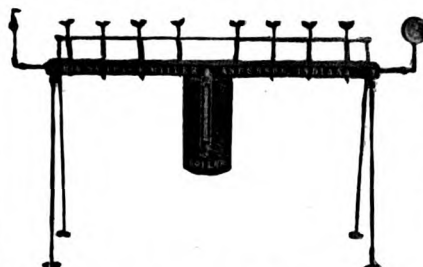
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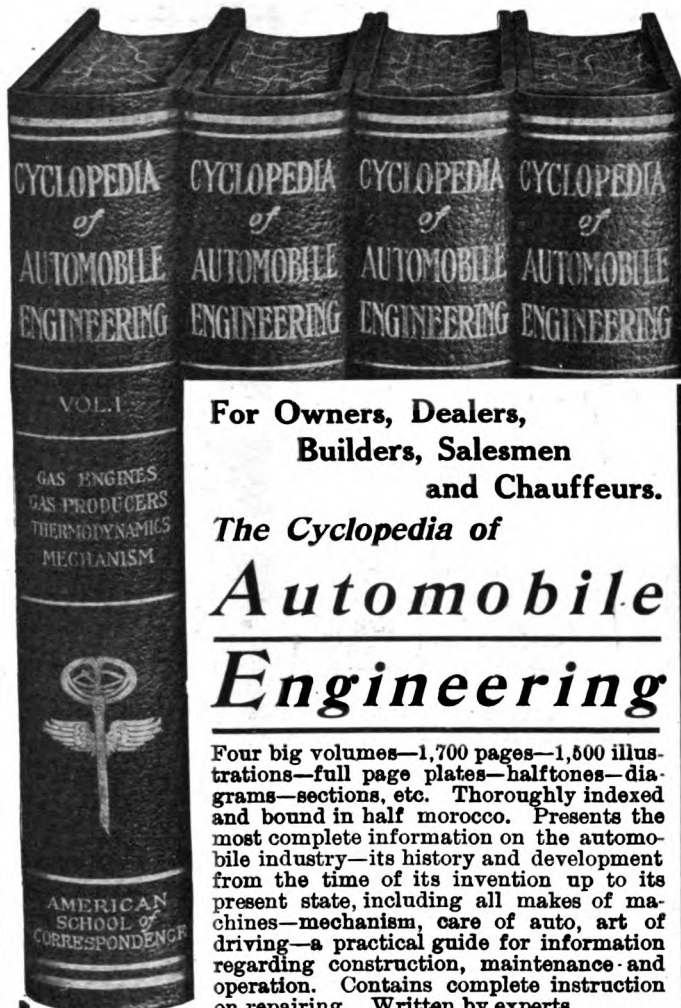
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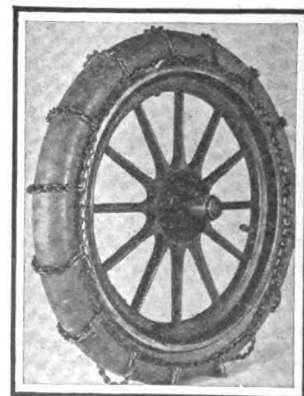
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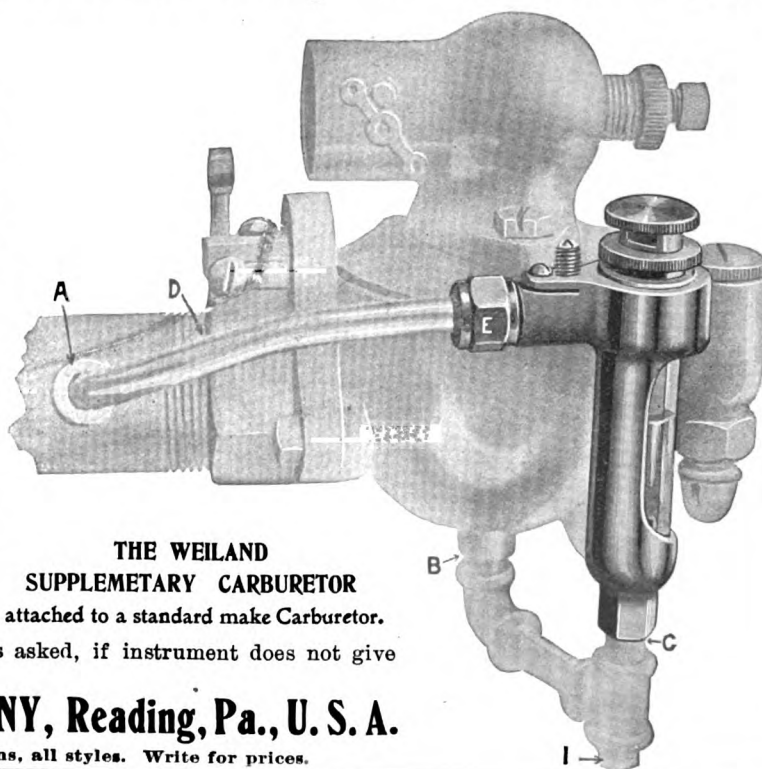
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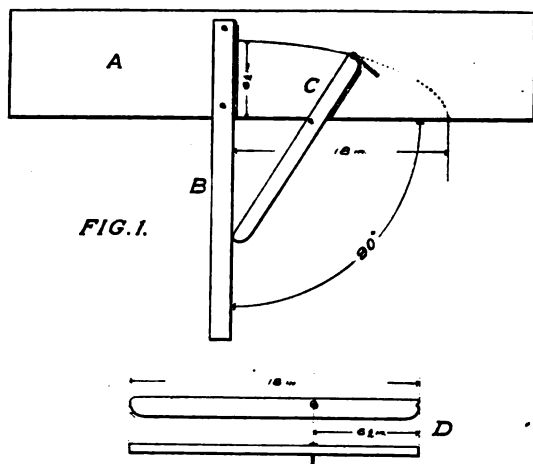


FIG. 1.

3. With these three illustrations we show an easy and simple method of making an ellipse that is so accurate it will serve the purpose of any proposition requiring an elliptical shape.

A, Fig. 1, is a piece of board with one edge made straight. B is a narrower piece of board, with one straight edge and is nailed on the piece A, making sure

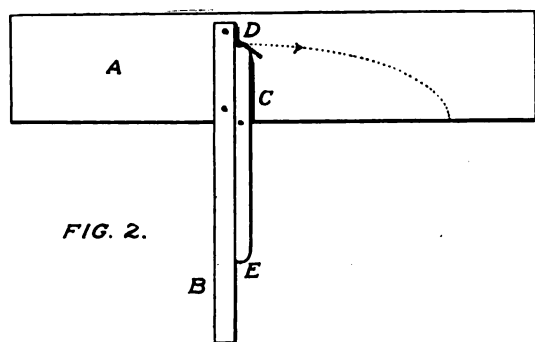


FIG. 2.

that the straight edges of both pieces are at right angles, or ninety degrees, as shown on the above-mentioned figure. C, Fig. 1, is another straight stick which in this case is 18 inches long. This is half the length of the oval that we are to construct and $6\frac{1}{2}$ inches is the half of the width. We therefore drive a small wire nail, as shown in D, $6\frac{1}{2}$ inches from one end. Diagram D illustrates the top and side views of stick C, Fig. 1.

Starting as in Fig. 2 and holding a pencil at the

edge, D, and allowing the nail in C to bear against the straight of A, we move the pencil along the line indicated by the arrow, the end D acting as a guide for the pencil and the end E bearing against the straight edge of B, with the nail bearing against the edge of A, form two points of contact, which give the desired shape of a true one-quarter oval. This can be used as a pattern to complete the full figure. Fig. 1, Fig. 2 and Fig. 3 show the guide C in three different positions of its course in making the quarter oval.

Fig. 5 shows a home-made tool that so far as the writer is aware, is without a name. Its use is for

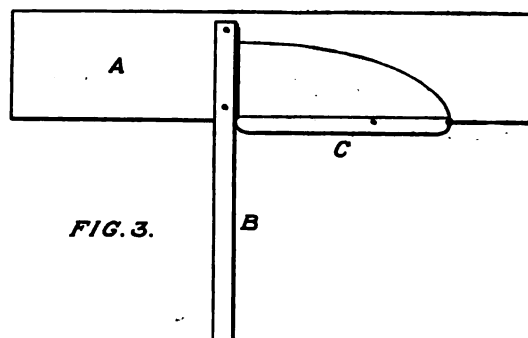


FIG. 3.

the same purpose as the foregoing illustrations, namely, to construct a true oval of any given length and width. This is an improvement, however, as the full shape of the oval can be drawn out at once, whereas with the previous illustrations, Figs. 1, 2 and 3, it is necessary to construct a pattern of the quarter section in order to complete the figure.

Fig. 4 shows the assembly of the parts as illustrated in Figs. 5 and 6. In the original from which this

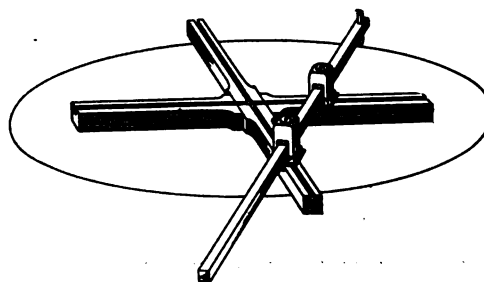


FIG. 4.

drawing was made all the parts are of wood except the pins that travel in the groove and a small slide plate in the posts. These are made of bone, see Fig. 5. The bar in this same figure is $\frac{3}{8}$ -inch square, of wood, and is mortised through the posts. In Fig. 6 the cross is 1-inch square at the ends and in the center is 1 inch by $1\frac{3}{8}$ inches, made of wood. The groove is $\frac{1}{4}$ -inch deep by $\frac{1}{4}$ -inch wide. If the tool is to be used for ovals less than 24 inches long we advise making it lighter.

To make use of this tool, the rule is the same as

for Figs. 1 to 3. The pencil corresponds to the end D, the post nearest the pencil to the nail in C and the other post to the end E. Having located the posts on the bar the right distance from the pencil, as illustrated in Fig. 5, it is only necessary to place the post pins,

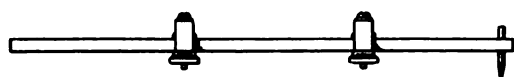


FIG. 5.

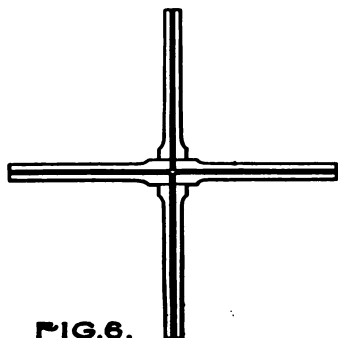


FIG. 6.

Fig. 5, in the grooves of Fig. 6. (See assembly, Fig. 4.) We now draw the pencil along the paper, allowing the pins to travel freely in the grooves and we have the desired oval.

With Fig. 7 we illustrate a simple method of mak-

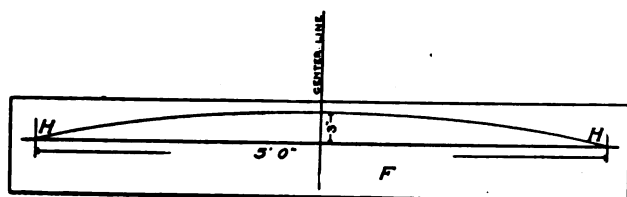


FIG. 7.

ing a true sweep. This is very useful in making patterns for bow sweeps, etc., and also the handy man around the garage at times has need of making a true sweep for partitions or for repair work.

For our illustration, we have selected a curve 5 feet

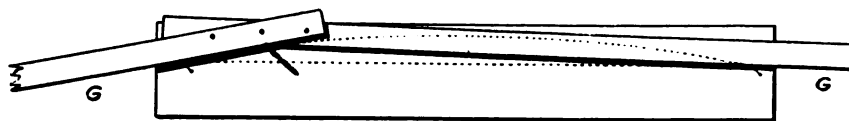


FIG. 8.

long by 3 inches high, and F, Fig. 7, shows a piece of board with these dimensions marked on it and also a curved line meeting the three points. On Fig. 8 we show the method of making this curved line by the

feet, H, H, half way between these points draw a perpendicular center line and from the base line on this center line lay off 3 inches, as illustrated in Fig. 7. Then place the two strips of board, G, G, in position, touching these three points that have been measured off and nail them together as illustrated in Fig. 9. The strips, G, G, must be each 5 feet long from the point where the cross each other to the end. You will see the reason of this in Fig. 8. Having driven a long nail in the board F at each point, H, H, and holding a pencil at the apex of the angle formed by G, G, we move the pencil guided by the pieces G, G, which in turn are bearing against the nails at H, H, each way from the center, as in Fig. 8, and this gives us the curved line as illustrated in Fig. 7.

CLUTCH AND THROTTLE.

How to Use Them to Get the Best Driving Results and to Avoid Trouble.

When the average novice first sits tremblingly behind the steering wheel of a car he regards the clutch pedal as his sheet anchor. When the trolley car appears suddenly, when the child darts out after its ball, when a look ahead reveals that the treacherous road has twisted right or left, when the courteous gradient dips and presents a wide vista of landscape, down stamps his trusty foot on the clutch pedal! At the outset his right foot probably follows suit with the brake pedal as well, but tales of tire bills have probably stamped upon his mind the dictum that the brake pedal must be used gingerly; consequently, he soon learns not to mark time with his right foot too frequently. But the excessive use of the clutch pedal never deserts some drivers—it is a bad habit that lingers on into the æon of his third or fourth car.

Both in theory and practice the clutch pedal exists only for stopping, starting, and changing gear. To use it for temporary slows is to abuse it. There is only one possible exception, namely, for temporary slows around exceedingly acute corners, and even this only applies when the car is on a gear too high to allow of the engine picking up upon it from what is almost a standstill. The majority of cars to-day are

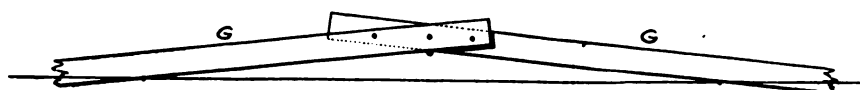


FIG. 9.

aid of the two pieces of board, G, G, fastened together, and Fig. 9 shows G, G, in detail.

To explain the process of making this curved line: After deciding that it is to be 5 feet long and to have 3 inches raise, or curve, on the piece of board F, Fig. 7, draw a straight line. On this straight line, lay off 5

designed and built to be driven almost exclusively on the throttle, apart from the above trio of exceptions, viz., stopping, starting, and changing gear.

At the present time I am driving a car which cannot

be said to be designed for this mode of handling. It is only 12 horsepower, and is afflicted with a racing gear ratio. But I have actually driven it for a fortnight without once declutching save for the three legitimate purposes named. All slowing down has been performed by simply bringing back the throttle

lever on the steering wheel sector to the "shut" position. Even with a racing gear it is astonishing how often the throttle may be re-opened without the engine giving any token of laboring; the engine merely re-accepts its work perfectly calmly and simply, without any pounding, laboring, or knocking, provided the throttle is not abruptly opened. Of course, if the throttle be shut for a prolonged slowing, and when the need of slowing is over, the car is faced by a stiffish gradient, a bad corner, or a very powerful head wind, a gear change is necessary. But under all these circumstances a gear change would have been necessary if the car had been slowed on the clutch instead of upon the throttle. Consequently, the rule holds good.

It even applies to traffic work. Perhaps a mile of rather tortuous, narrow, and trafficky streets has to be negotiated. No doubt by frequently using the clutch a good deal of the distance might be covered in brief and anxious sprints on the top gear, with interspersed descents on to second or even first speed. Actually, on facing such a mile I immediately change on to second gear, and remain upon it till clear of the town, thus clearing the traffic without a gear change and often without declutching at all. I leave the reader to imagine which method is more considerate of the car. The clutch method entails far greater strain on the engine bearings, introduces wear and charring of the clutch face, and connotes shocks to the teeth of the gear. The throttle method bars out of the question the face of the clutch and the teeth of the gears, as also any forced approximations of differing speeds for the engine-shafts and the gearshafts, concentrating the total strain upon the bearings of the engine and the gear box; and the behavior of both these portions becomes audible when they are abused, so that the driver can easily discover whether he is throwing too much on them. Mine never complain under this treatment.

Two details should be looked after in this type of driving. The first is to see that the throttle really shuts off the last atom of explosive mixture when it is alleged to be shut; otherwise disconcerting poppings will proceed from the aggrieved engine. The other is the fitting of an air bypass controlled by the throttle lever, so that when the gas is cut off an avenue of suction is opened into the air. This is not absolutely essential, but it makes for good cooling and prevents carbon deposits; for in its absence, the piston suction no doubts drags up a modicum of oil from the crank chamber, which is then burnt on to the piston and cylinder heads.

Waste in the Engine.

It should not be forgotten that economical as is the modern combustion engine, not more than twenty per cent. of the heat units developed by the complete combustion of the charge is utilized. There remains eighty per cent., of which fifty per cent. is lost to the cooling system and thirty per cent. is expelled through the exhaust. This waste of heat is by no means confined to the internal combustion engine, the waste being even greater in the case of the steam engine. If the interior of the cylinder could be inspected at the instant of explosion it would seem to be filled with a sheet of flame. With the explosion the sudden expansion of the charge of gas and resulting pressure rise perform a certain amount of work in driving the piston, that work, as indicated, being the utilization of approximately twenty per cent. of the heat units. At the end of the power stroke the gases have done their work. The dead or burned charge is then useless; as

a matter of fact it is worse than useless, since it contains a large amount of heat that is incapable of doing further work, hence the necessity for expelling those gases as thoroughly and rapidly as possible.

HANDLING GASOLINE.

In What Way It is Explosive and In What It is Safe to Use.

A gasoline explosion is simply a very rapid combustion causing great heat and consequent expansion of the gas resulting from this combustion. This rapid expansion is what causes the piston to be driven downward when the charge is ignited in the cylinder or which blows out the garage sides when the same kind of a mixture is ignited within.

Since combustion of any substance is only possible in the presence of air or oxygen, and since gasoline contains neither, it is readily seen that it cannot be ignited in a tank, in other words, in a liquid form. In order that gasoline, or in fact any liquid fuel, can be ignited, it must first be vaporized, then mixed with the proper proportion of air. Whenever air comes into contact with gasoline the process of vaporization is set up and the gas resulting is, in general, combustible. It is not combustible, however, unless the proportions of gasoline vapor and air are within certain limits. A combustible mixture is rendered incombustible by the addition of more air, thus diluting it, or by adding more vapor, enriching it. This is readily understood when it is remembered how carefully the needle valve must be adjusted that ignition in the cylinder may result.

When gasoline finds its way on the floor of a garage from leaky pipes or tanks, or a flooded carburetor, this vaporization and mixing with air immediately results. In an open space a combustible mixture would seldom result except close to the surface of the free gasoline. In a closed room this situation might cause the whole interior to become filled with a highly combustible mixture. When a lantern, lighted match, or an electric spark is introduced into such an atmosphere an explosion is more than likely to result. It might be stated that nearly every burning of a garage is due to just such situation. Men have actually been known to go prowling around through a room with a lantern in search of a leak in the fuel tanks or pipes. To be blown out through the walls is the natural consequence.

Gasoline is what is termed highly volatile and vaporizes easily. The application of heat causes the liquid to gasify. At or below a certain temperature it remains liquid and at higher temperatures vaporization takes place. This vaporization in the presence of air is productive of a combustible mixture but when vaporized in a closed tank the gas resulting is not combustible. The application of heat alone in any quantity cannot cause an explosion. If the containing vessel be closed the application of heat might cause sufficient pressure to burst it, but so long as the vapor does not come into contact with the flame and in the presence of air, no ignition or combustion will result.

If a can of gasoline be set on a stove it will boil away just as water would. Now supposing this can to have a small vent in the top just sufficient to relieve the pressure caused by the expansion due to heating, a match applied at this opening will simply cause the issuing gas to burn just as the gas from a jet in your home. It is no more possible for the flame to enter the can than for the flame at the gas jet to run back into the pipe. This is just the condition prevailing in a

gasoline tank in an automobile. The atmosphere above the gasoline in the tank would, in almost no instance, contain more than a very small percentage of air. For this reason it would be next to impossible for the tank to explode. Explosion of the tank could not take place other than by the flame entering and causing greater pressure than the vent could relieve or the tank withstand.

We often hear stories about fire actually running back through the gasoline pipe to the tank. This is ridiculous. Simply remember that there being no air and gasoline vapor in mixture in the proper proportions, there can be no fire or explosion.

Under the most favorable conditions it takes some considerable heat to cause a mixture of gasoline vapor and air to ignite. The popular story about a gasoline fire caused by proximity of a lighted cigar is a myth. It takes more than that on the end of a cigar to cause ignition; to immerse the end of a lighted cigar into a dish of gasoline would have no other effect than though it were so much water. The ignition of a mixture of gasoline vapor and air requires a flame or electric spark or red hot iron, etc. The only danger, so far as the cigar is concerned, is due to the match which lights it.

All this goes to show that gasoline is not the terribly dangerous substance that it is generally supposed to be, when handled with reasonable precaution. The chief requirement for safety is that tanks and piping be provided of such character as to preclude the possibility of leakage. There is no danger whatever from any gasoline contained in tight tanks. The fact that gasoline vapor is heavier than air causes it to lay in the lowest places. A quantity of gasoline floating on top of water will cause vapor to be given off which will be practically unmixed with air close to the surface of the liquid, but higher up the mixture becomes heavier until at some point there will be pure air. At an intermediate point there will be a highly inflammable mixture which a flame easily ignites.

In case a fire should break out, do not waste time by throwing water upon it. Gasoline is lighter than water and since the two liquids will not mix the gasoline will float, and throwing water upon it further agitates the gasoline, causing more gas to be given off, consequently there will be more fire instead of less. Every garage should be provided with one or more good fire extinguishers so placed that they can be reached quickly. A very excellent fire extinguisher is a bottle of siphon seltzer or soda. A stream from one of them directed upon a gasoline blaze is about as effective as anything that can be used.

In the absence of fire extinguishers of any kind the use of blankets or cloth of any kind to smother the flames is about the only alternative, although gravel or sand are useful, if handy.

Silencing a Vibrator Coil.

Having been annoyed by the noise (ticking) made by the vibrators on my car, I made a muffler, and find it a very great improvement, as I do not notice the ticking at all now. I made a double cover to fit the box containing the vibrator, of ordinary glazed lining, with cotton-wool between (similar to a teapot cosy), and covered it with white indiarubber sheeting, my car being white.

It is a mistake to lubricate magneto bearings too frequently. While ball bearings require little oil, they should not, however, be overlooked entirely.

A GOOD CAR.

Points that Should Not Be Overlooked in Making a Selection.

It is not necessary for a man to be a good mechanic to select a good automobile. In fact, a good mechanic is liable to select a poor one. In selecting a car use the sensible way: You have eyes and ears. Your eyes will tell you how the car looks. Your ears will tell you whether it makes much noise or little. You can also ride, and in this way you can find out whether the car rides easily or hard. And what you don't know or can't find out yourself you can get some one who knows all about cars to tell you.

But there are a few hints that may be useful in selecting a car: First of all, note whether the car seats the number of passengers you desire to provide for, and seats them comfortably. If passengers must be wedged into place you will do well to avoid that car, else you would forfeit comfort at the start. And if you can't have comfort, why have a car at all?

Observe whether the car has ample power to carry its full complement of passengers at the desired speeds. An under-powered car is always a disappointment. And note this trick of the trade: A car may be geared so high that it will run fast on the level and yet be unequal to the first hill of any consequence. Or it may be geared so low that it will scale hills handily, but be unable to show real speed on the level. Hence in trying out a car insist upon having the same car show its power and speed on both hill and level on the same ride.

In hill climbing do not be satisfied with mere speed or high-gear success. Stop the car on the grade and note how it gets under way again. Occasions will come when you will be required to stop on hills and you need to know what to expect. The car that will pick up handily in a test of this kind shows merit.

Is the motor quiet? A noisy motor is years behind the times and ought to be avoided, because it is an imperfect motor. Run the motor at various speeds, while the car stands. If the car vibrates materially, the motor is imperfect. The more the vibration, the sooner will that motor wear itself out, the car as well. Economy says avoid vibration.

Flexibility means range of motor speed on the throttle, without changing gears. Have the car run on high gear, and see how slowly it will run—without slipping the clutch. Clutch slipping is a driver's trick, and you don't buy it in the car. Have the driver keep the clutch in full contact. Then the car that shows the widest range of speed on high gear is the most flexible.

Flexibility is important because it avoids gear changing, saves motor work, reduces wear and tear on motor and transmission and means economy of fuel. The driver who is compelled to shift gears in and out of traffic does work that a really flexible motor would do for him.

Slow down the motor on high gear and have it pick up speed as quickly as possible. The sluggish motor, the motor that gains headway slowly under load, is not one of quality and is always bad in traffic.

Note whether the driver is required to crank the car for any length of time in order to start the motor. Some of the best cars are equipped with self-starters, which render cranking unnecessary. Cranking is always disagreeable.

Require the salesman to give you trustworthy statements of the durability of his car. There are cars which seem to possess many merits, but lack that of

durability and are expensive in upkeep. The only makers who are sure of their ground on this point have abundant evidence to present to you.

Extremely light weight cars ride hard and are likely not to withstand hard usage. Heavy-weight cars withstand hard usage, but eat up tires and fuel. Either kind is highly expensive in-upkeep. Medium-weight cars avoid these faults.

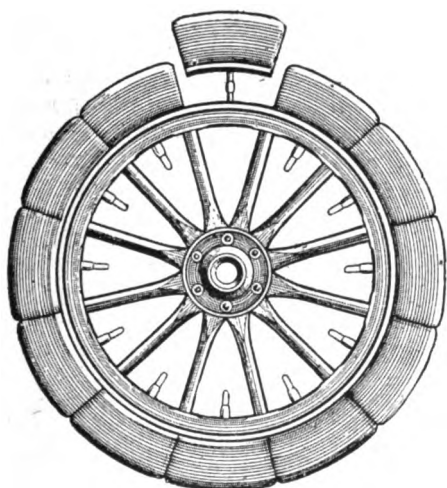
Any casual observer can tell the general character of a car by its appearance. Where slipshod work appears that car is to be avoided. Beauty of body lines and work, of painting and upholstery, unmistakably mark the high grade car.

Does the car ride comfortably? Sit in the tonneau, for the front seat of any car is almost always more comfortable. The tonneau gives the test. Try ruts and bumps, and note how you suffer or are free from annoyance. And remember that the tonneau is where your wife or sweetheart or mother or friends will ride, and surely you want them to enjoy riding and not to find it a bugbear.

Who are the makers? What experience have they had in building the particular car offered for your purchase? And what has been the experience of their customers in the past? Do customers enjoy prompt and cheerful service? Should you need a supply part, what assurance have you of getting it quickly? Are the makers stable, or may an adverse wind blow them away and materially injure your investment? That condition has happened in the past and may happen again; you can avoid it in your case by making sure of your ground before you purchase. There are standard makers who may be patronized safely; be sure the maker you patronize is of the right kind.

A Sectional Pneumatic Tire.

A new automobile tire which is drawing much attention abroad is shown in this illustration. The feature of the invention in the fact that the pneumatic tire is sectional, each section having its own valve and being blown up separately. Twelve sections make the complete tire, and should any one of them burst or be punctured, it is only necessary to remove that



Sectional Tire.

one and put on a new one, several extra sections being carried.

The idea is not new. It was adapted to bicycle tires years ago, but for some reason it did not come into general use. There is no apparent reason, however, why there should not be a saving as well as a convenience to it. Pneumatic tires rarely wear out all around to the same extent, or go to pieces "all at

once and nothing first," like the deacon's "One Horse Shay," and if by replacing the worn or bursted parts with new ones it will prolong the life of the tire there will be a certain amount saved as well as less recourse to the vulcanizer or repair man.

TIRE VULCANIZING.

How Owners May Do Small Sectional Work to Advantage.

Many an owner of a motor car, because of the fact that he has not enjoyed a large measure of success when making a vulcanized repair upon the tube or cover of his motor tires, has reluctantly discontinued to practice that highly interesting process, the process of vulcanization, which is a necessary adjunct to the economical upkeep of tires. The information upon the subject of tire repair by this method is not so widely disseminated as the merits of the process demand, especially as the car owner usually has very little time at his disposal for experimenting. More than that, these experiments are so likely to prove costly that he is prone to leave the work to a proficient chauffeur or, maybe, turn it over to the repair man. However, if he were only a little better informed upon the matter he would be willing to undertake the task himself again, or at least to supervise the operation personally. The work of reclaiming damaged tires has a fascination about it, due, perhaps, to its complex nature. That being so, a few practical notes will no doubt elucidate some of the difficulties to be met with, and perhaps clear the way for a perfect understanding of the reasons why success has not followed an attempt at repair work.

Complete retreading of a cover is essentially an undertaking for the professional repairer, and should never be attempted by a private owner, equipped only with a vulcanizer for small and sectional repair work, for if an attempt be made to vulcanize the retreaded cover with an apparatus of this description it will be found that on the application of heat to the part of the cover on the vulcanizer the pressure bearing upon the soft unvulcanized compound will cause it to spread in all directions, irrespective of the care taken when binding up the part affected.

If the tire be wet, exposure of the damaged part for a short time on the vulcanizer to a temperature of about 100° Cent., or to a pressure not exceeding ten pounds, will effectively drive off the moisture. Dry cloth or cotton wool should be inserted between the tire and the apparatus to facilitate the evaporation.

The vulcanizing compound is a well-balanced mixture, in which are embodied the chief characteristics of the tread, body, and tube. It is equally suitable for the repair of each one, but the essential points to bear in mind, so as to be able to obtain on each repair the peculiar features of the cover or tube operated upon, are the important factors of time and temperature or pressure.

Thus the repair of a deep cut penetrating through the body will require a more prolonged or severe vulcanization than the superficial repair on the tread or a puncture of the tube. Emphatically it must be stated that a prolonged exposure at a low temperature is infinitely better than one for a short time at a high temperature. Yet more satisfactory than either of these conditions is a short period, viz., fifteen to twenty minutes, at a low temperature, viz., 30-40 lbs. pressure equals 135 to 142 degrees Cent., and preference should be given to the compound susceptible to the latter treatment, provided it is the product of a repu-

table firm. It follows, then, that the less severe the thermal conditions, so long as vulcanization takes place, the stronger and more durable will be the resultant repair and the surrounding parts of the tire affected by the operation.

It is imperative for thick repair work that the job should not be subjected to the vulcanizing temperature immediately. A gradual rise of from five to ten minutes should be given, so that the heat can gradually penetrate. The fact that this precaution is very often neglected is the cause of many a bad repair, for, though it might have a sound surface, it is when cut or worn found to be hopelessly porous inside, and, of course, useless for further work.

The chief features to be considered when undertaking a repair are:

That the parts of the cover or tube to be reconstructed should be trimmed with caution, thoroughly freed from dirt, moisture, grease, or other extraneous matter, and then roughed with a rasp or coarse glass paper. A foundation is thus laid for a secure attachment, after being solutioned, of the unvulcanized compound to the vulcanized rubber of the tire.

Solution (cement) is made from the compound dissolved in naphtha (benzine), and should be thoroughly stirred before being used, for it is obvious that the materials of which it is composed, being of specific gravities varying from 0.90 to 9.36, will separate, forming strata, and as the mixture is made up of carefully weighed proportions, the absence of any part will have a pernicious effect upon the ultimate result. Small pieces of compound obtained when trimming a patch, etc., should be put into an airtight tin and covered with naphtha to make solution.

When preparing the patch, the best plan is to build it up, that is, to place one ply of compound upon the other, using the hand roller, until the desired thickness is reached. Care must be taken to disperse all air bubbles with a "pricker," and, furthermore, the sheet of compound being used should be wiped with a clean cloth moistened with naphtha. This application clears away dust and other impurities, and imparts a useful tackiness to the "gum." The small sheet or block is then cut to a shape having bevelled sides, so that it will fit snugly the cut or burst. All parts to come into contact, both on the patch and the tire, are then solutioned, the section on the tire being given three coats. That the solution is dry must be noted before the patch is applied, because during vulcanization the solvent—if any remain—will be rapidly driven off, causing numerous small holes to appear, which seriously impair the quality of the work done. Solution is sufficiently dry when if tested with a finger it is adhesive and yet remains firm. The top layer of a canvas reconstruction on the inside of the outer cover should be from two to three inches larger longitudinally at each end of the burst and wide enough laterally to envelop the bead of the tire at the patch.

THE ACTUAL VULCANIZING.

The renewed part is then prepared for the vulcanizer. If it be on the tube, a piece of calico is placed between the vulcanizing surface of the apparatus and the patch. The cloth should be slightly moistened with water. This precaution enables the operator to thoroughly smooth it out, and eliminates the possibility of lines or grooves appearing on the patch during vulcanization, through irregularities on the cloth's surface, and, moreover, the tube cannot adhere to the vulcanizer. Naphtha sparingly applied will help the

cloth to leave the patch easily if any difficulty arises in this respect.

Of course, it will be remembered that a piece of paper must be introduced into the tube before the patch is put on, to keep the repair from adhering to the inside of the tube.

French chalk should at all times be used with caution, and, wherever possible, entirely dispensed with.

The rebuilt part of the cover will be slipped over the mandrel of the vulcanizer, and tightly bound to it with strips of calico, or webbing, which should be damped as described. The repair is then arranged on the vulcanizer, under firm but gentle pressure, so that the surrounding parts of the section of the tire under treatment, and not the soft "gum," will sustain the pressure. The compound should be treated with regard to time and temperature, as advised by the manufacturer.

Finally, the old-fashioned thumb-nail test will indicate if vulcanization be complete, for under hard pressure no permanent indentation should remain upon the repair. Although a slightly under-vulcanized repair on the cover is preferable to one over-vulcanized, the object of the operator should be to obtain a result which has had the essential time and temperature to bring out the distinct qualities of the compound used. With regard to the inner tube, a slightly under-vulcanized condition is perhaps the more desirable for this part of the tire.

Brass and Iron Polishes.

In answer to numerous inquiries concerning a permanent polish for brass and iron fixtures on automobiles, it may be stated that there is of course nothing that is what may be called permanent, but the following will be found about the best formulas that can be had:

For a liquid metal polish: Procure eight ounces of Spanish whiting that is absolutely free from grit, and place it in one quart of gasoline. Shake up the whiting and gasoline thoroughly. As the whiting settles instantly add to each quart of the mixture 32 drops of oleic acid. Shake again and the whiting will not settle. By adding the acid it makes a better quality of polish. This polish can be applied to gold, silver, nickel, brass, glass or any kind of metallic surface with a piece of cotton flannel, rubbing well. Polish with a piece of the same cloth or use a piece of chamois. This is a very good polish. It should not be left near any flame as it is inflammable.

Now to protect this or any bright copper or brass surfaces against the weather it is necessary to coat them with a quick-drying transparent varnish, similar to that used for the preservation of process blocks. Such protective varnishes are sold, but if not readily obtainable, a serviceable one can be made by dissolving a little resin in rectified spirit, and filtering the solution through a plug of cotton wool, which will deprive it of any excess of resin. This varnish should be applied as thinly and evenly as possible, for it dries almost immediately. When desired, the thin transparent coating of varnish is easily removed by rubbing the surface with a soft rag dipped in methylated spirit.

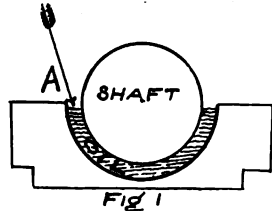
In Case of Emergency.

The advantages of dry cells as emergency batteries are that they are cheap, that they occupy very little space and may be carried either upright or on their sides, that they do not deteriorate quickly if intelligently stored away or are carried in one of the special holders now obtainable.

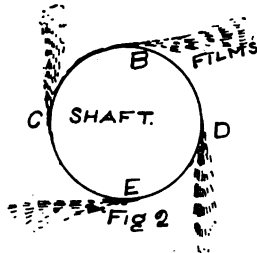
LUBRICATION.

A Few Random Thoughts That May Show Its Importance.

In this article we will take up the subject of lubrication of the bearings of the modern automobile. Like every other mechanical part of the automobile, numerous changes have occurred during the past dozen years in the lubricating of the machines. When the horseless carriages first appeared common types of

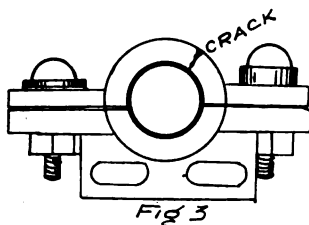


bearings were used in the mechanical design of the engine and other parts of the outfit. Often plain grease was applied to the slow-turning and simple journals. Sometimes the chauffeur merely daubed fat on the opening at the top of the box and let it go at that. I remember seeing an oil can upside down with the oil spout penetrating into a bearing. The average oiler was to squirt oil promiscuously about the machinery. But times have changed. The modern automobile requires careful lubrication. The slow-speeded



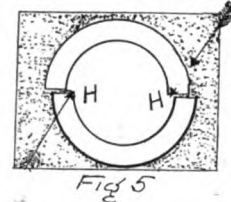
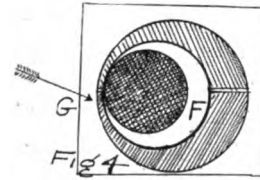
cars have given place to racing machines and racing machines call for finely constructed journals in which the oil-films must be properly applied. Otherwise they will heat, bind and create trouble. Therefore the accompanying sketches have been made to assist in illustrating this all-important point of effective lubrication. It is hardly necessary to make a preliminary study of oils for the reason that all reputable houses furnish you with the proper kind of oil, carefully labelled, upon application. Hence you do not need be an oil expert. But you should be an oiling expert.

First of all, let us look into the film formations that



the scientists tell us about. The man with the magnifying glasses who has made the thing a study explains that the oil films collect about anything that revolves in oil. This is so. Fig. 1 shows what would happen if a bearing of an automobile was designed thus. The space intervening at A would be flooded with oil. The shaft in revolving would collect layers of oil about the surfaces and these layers would be the films. If the oil films were packed on sufficiently and the shaft speeded up in its turn, the shaft would begin

throwing off the films from the points c, b, d, and e as in Fig. 2. But in the regular bearing, the films are not allowed to gather as in Fig. 1 or to be thrown off as in Fig. 2, because of the fact that the shaft is encased in the sleeves of its bearings as in Fig. 3. If the shaft fits well in the box and the cap is rightly adjusted, there will be just room enough between the

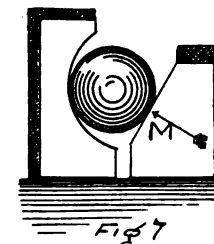


turning surfaces of the shaft and the surfaces which are dead, to allow the gathering of one or more thicknesses of oil films. As a rule the bearings of automobiles are thus set.

Still the bearing may heat. Perhaps the heating is due to a crack in the cap, which crack scrapes off the oil films and develops heat and grating. Perhaps the cap is screwed down too tight, so that there is no



space between the inside of the surface of the cap and the shaft. You have to allow space for the films. Still, you do not need an ocean of room. The opposite effect may arise when there is so much space that wobbling of the shaft occurs as in Fig. 4. In this example the shaft has become so badly worn that it revolves on one side of the bearing, leaving the opening at F. The sleeve is reduced to acute thinness at g. The oil may be flooded into this bearing, still it will grate, bind, heat and wobble. The only remedy is a new bearing or a new bushing. The only way to correct



bushings when they get into the order shown in Fig. 5 is to install new ones. Here we have a model of scraping edges of the halves of the bushings when the halves are worn out of line. The edges H, H, serve to remove the oil films by scraping and hence the journal heats. In the ball-bearing journal, look to the course or cone on which the ball runs. Observe the raceway. Often the proper lubrication cannot be had due to the seat wearing at K, Fig. 6. Or perhaps the bevel of the cone at M gets worn down, as in Fig. 7.

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ADVERTISING RATES MADE KNOWN ON APPLICATION

NEW YORK, OCTOBER, 1909.

Missing Numbers—Our readers are requested to remember that it always gives us pleasure to re-send numbers which have gone astray in the mails.

The Automobile Dealer and Repairer in Australia and New Zealand.

Mr. R. Hill, Matlock House, Devonport, Auckland, New Zealand, is our accredited representative in Australia and New Zealand for obtaining new subscriptions.

THE AUTOMOBILE OUTLOOK.

Intending purchasers of automobiles will find it unprofitable to wait for greater efficiency or lower prices. Not that there may not be slight improvements and possibly insignificant price reductions, but these will come slowly and will hardly be appreciable by a comparison of one year with another.

Competition both as to quality or efficiency and price is extremely sharp. Everything that unlimited capital can do in the way of economical production is the rule and not the exception. Profits are being measured by outputs of thousands of cars rather than by hundreds. Special machinery has been introduced for the fabrication of practically everything that makes for the complete automobile. The assembling has been reduced to almost a perfect system. The testing takes the form of a science.

The cost of distribution from the manufacturer to the consumer has likewise been carried to an approximate limit of profit. We have in mind a single firm that announces a product of 41,600 gasoline cars in 1910. This is more than \$40,000,000 worth of automobiles. Moreover, this firm feels confident that this number will be marketed as well as manufactured.

Of course there are drawbacks as well as advantages to a business of this magnitude. If the executive organization is not of the best, if the details are not in the hands of the most competent, if the distribution is not the most perfect, disaster will be as overwhelming as success may be gratifying.

Meantime, purchasers may be sure that if they go to any of the well established and reputable firms they will get more for their money in the purchase of an automobile than for anything else they ever owned.

Today the thing a car owner or an intending owner needs to give most attention is the care of a car after it has been purchased. No other machine receives anywhere near such hard usage. It receives such a shaking

and twisting and banging and pounding as nothing else of the kind ever received before or will again. But used intelligently and carefully it will give an astounding amount of satisfactory service; used carelessly and ignorantly, and it can be practically spoiled in a week.

CLAIM AND COUNTERCLAIM.

The use of the automobile has created a new and increasing source of litigation through highway and street collisions. Whether suits, which are mostly for heavy damages, will continue to multiply or whether some way will be found to avoid them it is difficult to prophesy. Here follows a case that is now in progress in St. Louis, and it is similar to scores of others that have sprung up all over the country.

In St. Louis, Mo., a woman named Van Blarcom has filed a counterclaim of \$25,000 to a suit brought by C. L. Gray against her for \$6,000 on account of damages growing out of a collision between the Gray and Van Blarcom automobiles. In his suit Gray says that the collision was due to the carelessness of the Van Blarcom chauffeur, who, it is alleged, failed to keep to the right of the road with his machine, and was running it at a reckless rate of speed. Gray's automobile was wrecked, he avers. He asks damages for the loss of his machine and the deprivation of its use.

Mrs. Van Blarcom was in her car when the collision occurred. She declares in her counter claim for damages she received great bodily injuries, and also a severe shock to her nervous system. Her automobile, too, she asserts, was damaged. It is declared by her that the collision was not due to the carelessness of her chauffeur, but to the carelessness of the Gray driver.

The foregoing is rather interesting. Suppose there were no witnesses of the collision, and no evidence in the way of marks on either car or highway, how is the case to be decided? The testimony on both sides will be that the other was to blame, and yet both parties cannot be to blame. A pretty tough case for judge and jury, we should say, and it inspires the thought that about the only remedy for anything of the sort is for all concerned to drive discreetly.

TWO IMPORTANT SUITS.

If there is really an exclusive basic patent on automobile engines that are propelled by gasoline vapor and one on spark plugs, the fact is of some importance to manufacturers and dealers. And according to the present legal status of both these suits such is the fact.

In the U. S. Circuit Court, Judge Hough has given out his finding in the Selden case, which was in the form of suits for infringements. The cases on which the decision was rendered include a suit against an American manufacturer, one against selling agents for automobiles, one against importers of automobiles, and one against a user of an infringing automobile. Concurrently, there have been more than fifty suits pending and awaiting the outcome of this one, which was brought against an importer of a machine known as the Panhard and its American agent, and the American agent of the Renault machine, as well as the manufacturer and agent and a user of a car known as the Ford.

Judge Hough is of the opinion that there is clearly room for a pioneer patent and that Selden's is such a patent. This decision affects all manufacturers with the exception of the Licensed Automobile Manufacturers' Association. Of course the case will be carried to the highest courts in the country and it will be a long time before a final settlement is made. Quite likely those

manufacturers who have been working under a license from Selden thought that this was the simplest and least annoying course to pursue, and thus far events have justified their feelings.

As to the spark plug litigation it appears that A. R. Mosler & Co., of New York, have begun a suit in the United States Circuit Court against a supply company for infringement of the well known Canfield United States patent for spark plugs, and owned by them. This patent broadly covers a spark plug provided with a deep chamber or recess around the electrode for the purpose of preventing an injurious accumulation of soot or other foul matter on the insulation of the electrode, which is a feature of the best known spark plugs now upon the market.

Both these suits are of great importance to manufacturers, dealers in and users of gasoline automobiles, and consequently will be watched with interest.

THE SUPPLY OF RUBBER.

Inventive geniuses who have got the idea that something may finally be devised to take the place of rubber for pneumatic tires should understand that several kinds of material will do that already—for a little time. The difficulty is that nothing has as yet been found that will wear equal to rubber. Leather itself is a fairly good substitute, and possibly some compound may be found sooner or later that will be as resilient as rubber and yet wear as well. Surely there is need of it.

At the present time the supply of crude rubber falls far short of the demand and the rise in its price has forced a second increase in automobile tire prices within the past two months. It is estimated that the tire output for the current year will amount to nearly \$30,000,000 and that next year it will run up to half as much again. It is owing to its large demand and to the local conditions in the rubber districts that have caused pure rubber to rise from 67 cents a pound about a year and a half ago to \$2.15 a pound, and there is very little output even at this price.

It is pretty generally known that most of the rubber used comes from way up the Amazon River, although Mexico and Africa produce rubber of an inferior grade. The man who will go to the rubber localities of South America and establish a gum forest is assured of an everlasting fortune. He ought to start, however, before he has too many gray hairs in his head.

THE CRIMINAL REMNANT.

Has any one reflected that those who make all the trouble driving cars—who have all the accidents, who most constantly violate the rules of the road, and who try and often succeed in escaping after having done some damage—comprise but a mere bagatelle of the entire number who use automobiles?

But this is the fact, just the same. For the qualities that produce a violation of any one of these rules or principles of conduct exist in the violation of any of the others. In other words, the car driver who is constantly having accidents is the man who will try to escape the consequences of his misdeeds; the man who drives quite oblivious of the rights of others to a use of the highways is the one who makes practically all the trouble.

Numerically he does not comprise one in twenty among car users, and it seems as if the nineteen car users of character might soon eliminate the one disreputable one. They could if they acted in concert.

Not long ago the writer was driving in the country, and made a half dozen attempts to pass a car containing a parcel of rowdies, quite likely on a so-called "joy ride," and either in a car taken surreptitiously from some garage or one belonging to some municipality. They kept their car fairly well to the right of the road until an attempt was made to pass them, when they would immediately increase speed and return so far into the middle of the road that the only alternative was a fall behind again. To have persisted in an attempt to pass their car would have either caused a collision or resulted in unlawful or dangerous speed. The driver was probably half full of whiskey, and he wanted to show others that no one could pass him on the road.

Of course this was exasperating, but what could be done about it? Nothing commensurate with the time and trouble necessary to bring them to book. And it is this remnant—this slight fraction of the whole who have ignorance in their heads and criminal feelings lurking in their hearts—that brings the whole automobile driving class into unmerited disrepute. One repulsive snake will disturb and roil a stream more than all the fish that can swim in it.

WHAT IS A GENTLEMAN?

One of the daily newspapers of this city has been engaged in an animated and picturesque discussion of what constitutes a gentleman. The question is not a new one, but in order to save contentious vocabulary, how would it do to define a gentleman as one who drives a car discreetly and with due regard for the rights of others?

Surely nothing can be more trying to a man's patience or a better test of his innate feelings than driving a car in some localities.

In the East Side of New York the other day, in order to avoid one of a number of boys who taunted the driver and dared him to run them down, the car was turned upon the sidewalk and with such momentum it could not be stopped before crushing the life out of a little two-year-old girl.

Of course, there was a howl, and when one asks why children are permitted to play in the streets, the excuse is immediately made, "But there is no other place for them to play."

LESSONS FOR DRIVERS.

Carelessness and Ignorance Responsible for Most Accidents.

It is gratifying to note a diminution in the reported automobile accidents this month. During the early part of the season there came to this office an average of reports of more than 75 accidents per day. Now we get about half that number. Of these it is not worth while taking up much space to "point a moral" but some of the following may be the means of inculcating greater care on the part of drivers.

He Simply Forgot.—A young man was driving his car in a street in White Plains, N. Y., when he found his way blocked by an ice wagon. He did not see it until he was almost upon it, and then instead of throwing off his speed lever he applied the brakes, bringing the big machine to a stop almost instantly. Soon afterward the ice wagon was pulled out of the way, leaving the road clear, but the driver, forgetting all about the speed lever, jumped out and started to "crank up." He had hardly given the lever one twist before the machine bounded full speed ahead. He jumped and the front wheels only grazed him. A young man and his sister were on the

sidewalk, unconscious of any impending danger. The automobile literally jumped at them without a moment's warning, running full speed on to the sidewalk and knocking them before it. The girl was struck by the mud guard and fell clear of the wheels. The young man was caught squarely and thrown down under the machine with terrific force. It is feared his skull is fractured and there is some doubt as to whether he will recover.

The Brake Failed.—Near Logansport, Ind., a man and his wife had a thrilling ride down one of the steepest hills in the State, following the failure of the brake to operate. The car rushed down a hill, tore down forty feet of fence, the outer wall of a house, and stopped only when it had plunged half way into the kitchen. The automobile first climbed a small porch, then headed toward an open door. That being too small, part of the wall was torn down. The machine was nearly to the cook stove on the other side of the kitchen when it stopped. There was a small baby in the kitchen, but the machine missed it. There was not much left of the car when it stopped; and the house looked as if it had been struck by a cyclone. The occupants of the car were simply well shaken and frightened half out of their wits.

Always Unexpected.—A man who refused to give his name or address was driving through Tinton Falls, N. J., when the rear tire exploded. A new tire was sent for and while it was being put on, some young folk of the town watched the way it was being done. When all was ready the owner of the automobile asked them if they would ride with him for a ways and show him the right road. They accepted his offer and he started the machine at a fast rate of speed. The man was unacquainted with the roads and he failed to see a sharp turn just outside of the village. The automobile ran off the road, broke through a barbed wire fence and stopped with its front wheels on a bank and the rear wheels in a ditch. The owner of the automobile was not hurt, but two of the young people in the machine were not so fortunate. One young man cut his hand on the barbed wire fence and another's back was hurt. A young lady fainted, but this was due more to fright than anything else. The injured persons were taken to the office of a doctor. The owner said he would pay the doctor for looking after the injured people. Several persons asked the automobilist his name and where he lived and to these questions he replied that he didn't know.

Danger in Passing.—A good many accidents have occurred recently owing to cars passing each other at too high speeds. When going rapidly it is dangerous to swerve to the side of the road, especially when the road slopes toward the ditch. Moreover, even a slight turn when a car is being speeded is liable to cause skidding. When the car has the whole road to itself, if the road be smooth and fairly straight, there is absolutely no danger. In St. Paul, Minn., recently an accident in which a young woman was killed is thus described by one of the victims: "I don't know whether I can tell about the accident or not. It all came so sudden. We had been driving since 1 o'clock and the chauffeur had been unusually careful. On our way back, however, he put on more speed, and when we noticed the farmer's wagon coming, we were going very rapidly. The chauffeur turned to the right and passed the wagon all right, but in getting back to the middle of the road the machine skidded. I remember that we went from side to side three times, the driver doing all that he could to get the car back into the road. Then I heard my little girl scream and all of us were thrown out. I was only stunned and soon came to. Miss Lord was lying very close to the car and there was an enormous cut on her left temple. Her face

was bruised and she was barely breathing. My own daughter was lying still twenty feet from the car, and when I ran to her, she moved, and I knew she was not dead. Then some ladies took Miss Lord away in a machine and Gertrude and I were brought to the hospital in another automobile."

Skidded on Loose Gravel.—After having just returned from Europe where she made a trip of more than a car, and near the bottom of the hill it got beyond con-gravel did not supply sufficient foundation to hold the trol and crashed into a culvert. The occupants were bruised and one received a compound fracture of the leg. The car was pretty well smashed up.

Just Joy Riding.—Near Seattle, Wash., a party of seven had been out all night "joy riding,"—a most opprobrious term—and they finally came to a sharp turn on a trestle over the tide flats. The driver could not or did not turn the car but ran straight ahead and crashed through the railing, landing 25 feet below. Three women were killed and three men and a woman seriously injured. The chauffeur was not fatally injured, and he says the steering gear broke, otherwise the disaster would not have happened. Disguise it as we may, the disaster was primarily due to high speed—the cause of most accidents. If the car had been going at a rational speed, it would not have gone over the trestle, even though the steering gear had gone wrong.

Struck a Rut.—The driver who is not mindful of ruts in the road is liable to get into trouble. If the ruts are deep and the sides of the ruts are hard, to turn the car out of them is likely to injure the wheels or the steering gear, and if the car is being driven fast it is likely to be overturned. At Americus, Ga., an automobile was being driven at great speed at night and in darkness when it struck a rut in the roadway. It overturned, went down an eight-foot embankment, and instantly killed two of the occupants and fearfully injured another. The two killed were pinned under the car and literally roasted to death. The other, although frightfully burned, car down hill near New Bethel, Indiana, when the loose ran screaming to the city, two miles away. The car was burned to a mass of junk, concealing beneath the ruins 1600 miles without an accident, a woman was taking a the blackened bones of the two victims.

Dodging a Mudhole.—Near Corunna, Mich., a man and his wife were riding in a light runabout. In trying to dodge a mudhole the car was plunged into a ditch and turned turtle. The woman was pinned beneath the overturned car which quickly caught fire from the blazing gasoline and her clothing was ignited. Seeing his wife's peril, the husband, who was hurled clear of the machine, crawled nearly a rod despite his broken limb, lifted the machine and pulled his wife from under the car. The woman walked to a farm house 40 rods away where she fainted. She is badly burned from the hips down and the shock, it is feared, may result fatally. The auto was destroyed by fire.

Unusually Fatal Joy Ride.—With a crash that could be heard for blocks a big touring car in which were three joy riders, two of them policemen, crashed into a huge hay wagon containing forty or more young people returning from an excursion to Coney Island. The accident occurred in Brooklyn. The touring car was proceeding at a high rate of speed after a frenzied ride. The wagon was almost safely across the street when the collision occurred. The gay church picnic party was singing and playing musical instruments at the time. Many of them saw the approaching automobile, but assumed that the chauffeur was aware of their presence and

would turn out. But evidently he wasn't, for the machine kept on a straight path, striking the wagon at the rear wheel. Several of the riders saw a collision was impending and jumped to the street. The crash was terrific. The wheels of the wagon were smashed and the vehicle turned over, throwing all the occupants headlong. Two fell up against a tree. The chauffeur of the car died later in the hospital. The other two are in hospitals with fractures of the skull and internal injuries. They have but little chance to recover. Ten of the occupants of the wagon were injured severely enough to require the attention of physicians. The others were also hurt, but not so severely. The automobile is a complete wreck, while the wagon is badly damaged.

Death in Saving a Hat.—A gust of wind blew a man's hat off while the car in which he and three others were riding near Philadelphia. He jumped up to catch it, and the chauffeur hastily threw on the brake, and lost control of the car. It skidded, grazed a telephone pole and plunged 100 feet into the woods at the roadside. It brought up against a pine tree, killing instantly the man who had lost his hat. The other three occupants were thrown out and badly injured, while the car was completely wrecked.

A Cloud of Dust.—An automobile salesman was at last accounts, in a hospital at Hudson, N. Y., with both arms broken and otherwise cut and bruised. He had a chauffeur and was riding from Poughkeepsie to Syracuse. Coming along at a fast clip the chauffeur did not observe that he was close on another automobile, the cloud of dust obscuring his vision. Suddenly a machine ahead loomed up, and to prevent the fast auto from smashing into it the chauffeur ditched his machine, which ran into a marsh by the roadside and came to a standstill so suddenly that the occupants were thrown out, with the result stated.

IMPORTANT LEGAL DECISIONS.

Rights of Automobilist and Pedestrian.—In this case it was contended that the automobile driver did not have to leave the left side of the road and turn to the right in order to avoid collision with an approaching pedestrian; and that since if a turn was to be made at all it would have to be made to the right, the law required no turn to be made, and the automobile had a right to drive straight ahead irrespective of the danger to the pedestrian. The Court in Indiana ruled otherwise, holding that such a contention would leave the pedestrian without protection of any kind from owners of automobiles or vehicles. "The rights of pedestrians and vehicles upon the highways are equal; and drivers are required to exercise such care and prudence as the circumstances demand."

Passing a Car Ahead.—Two automobiles were going the same way on a highway and the rear car being of higher speed and desiring to avoid the dust of the car ahead asked repeatedly for road privilege, and at last attempted to pass. The evidence was in conflict as to the respective guilt of the two parties, but in some manner the car ahead (Plaintiff's) was crowded off the road and injured. The lower court in New York State found for the defendant and the case was affirmed on appeal. The court says in substance that the common law rules applicable to ordinary vehicles are equally applicable to automobiles except where changed by statute. That when two cars are going in the same direction the car ahead has the privilege of the road, which may be enjoyed within reasonable limitations without interruption. That, however, when a car behind wishes to pass and the road is not sufficient to allow such car to pass with-

out the car ahead turning aside, then upon proper request made the car ahead must turn aside if it can do so without danger, and allow the rear car to pass at the left side. The rear car in such a case can not ask the right to pass at a point in the road where the act of turning aside might endanger the car ahead, and if such demand is made, the car ahead may refuse to accede to it.

Definition of a Broker.—A New York court holds here that a party to constitute himself a broker so as to entitle himself to a commission for the sale of an automobile must show that he was the procuring cause of the sale, that he found the customer and that he caused the minds of the parties to meet and agree upon the price and terms of sale.

Car and Crated Tires Dutiable.—In the case of an automobile brought into the country in a crate without tires attached but with four tires in the crate, the Court held that such a car was dutiable as an entirety even though the tires in the crate were never actually used on the car.

Non-Residents Require no License.—A municipal ordinance provides in substance that no vehicle "shall be used upon the streets of Columbus (Ohio) unless the same shall have been licensed." Held that such an ordinance could not be made to apply to non-residents of the city who merely drove through the streets of Columbus occasionally, and who used the streets only for their own pleasure or private business.

Must Give Warning.—In Iowa the plaintiff's horse was being driven by a servant on the south side of a street and the inside wheel was one or two feet from the curbing. When halfway between two cross streets, the defendant's automobile driven by himself, which was moving in the same direction at a speed of from ten to fourteen miles an hour came opposite the horse and buggy without any warning of its approach. Neither the horse nor its driver was aware of the approach of the automobile until it was opposite the driver. The horse became frightened and turned to the south, drawing the cart wheel to the curbing. This threw the driver out of balance and he lost partial control of the horse, which ran forward into a telephone pole and broke its shoulder. The trial resulted in a judgment in favor of the plaintiff and an appeal was taken. The Supreme Court of Iowa held that "one may travel in a motor vehicle on the streets, but in so doing the care exacted necessarily depends somewhat on the rate of speed, size and appearance, manner of movement, noise, and the like of such vehicle, as well as the means of locomotion of others on the highway." The question of whether the driver of the machine was, under the particular circumstances of this case, guilty of negligence was one for the jury to determine.

To Fasten Rubber to Metal.

Rubber matting may be secured to metal surfaces by using cement made by dissolving flake shellac in alcohol to form a thick syrup. Several thin coats carefully applied should be given to each surface, and the first should not be allowed to get quite dry before another is applied. Press the rubber carefully upon the metal, and by the use of a piece of board and rather heavy weights keep the two surfaces pressed together for about 24 hours.

Another New Battery.

Great things are promised of a new storage battery which is being tried out on vehicles in New York City. It is said it may revolutionize the motive power of electric vehicles.

THE REPAIR SHOP

THE ENGINE CYLINDER.

Why Compression is Necessary and Why a Fat Spark is Required.

BY SIDNEY F. WALKER.

The working of the engine of a motor car, so far as the explosions, etc., are concerned, is now looked upon as a very ordinary matter, and the action is more or less taken as a matter of course. A little consideration will show that it is by no means the ordinary thing it is supposed to be, and that the efficient working of the engine

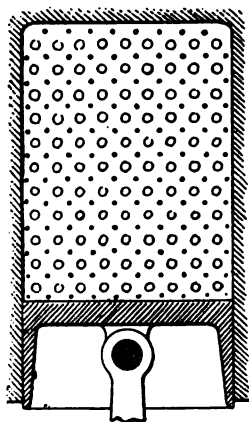


Fig. 1—Diagrammatic view of gasoline engine cylinder at end of suction stroke. The open circles are supposed to represent molecules of gasoline and the black dots molecules of oxygen. The diagram is intended to illustrate the fact that the molecules lie apart.

and the efficient running of the car, depend very largely indeed upon what happens in the cylinder. Everybody knows the working of the four cycle engine; that on the first stroke gasoline vapor and air are drawn into the cylinder, on the second stroke compressed, on the third stroke fired, and on the fourth stroke the products of combustion are expelled. In the majority of cases it is thought also, that all that matters is getting a sufficient quantity of gasoline vapor into the cylinder, according to the work the engine has to perform. But as those who have studied the subject know, very much depends upon the proportion of gasoline vapor to air that the charge consists of, and still more upon the amount of compression to which the charge is subject, and even more so upon the proper firing of the charge.

In Fig. 1 is shown diagrammatically, and in a very exaggerated form, the condition of the molecules of gas and air as they exist in the cylinder, before the charge is compressed. It will be noticed that the molecules are widely separated. It must be clearly understood that the drawing is purposely exaggerated to an enormous extent. The distance between the molecules under the very worst conditions is only a very minute fraction of an inch, but the difference between this distance and the much smaller distance comparatively that is produced when the charge is compressed makes the whole difference in the effect of the explosion.

In Fig. 2 is shown, also diagrammatically, and also very much exaggerated, the condition of the charge after compression. It will be noticed that the molecules are now very much closer together. The meaning of this is that each atom of carbon, and each atom of oxygen,

contained in the gasoline vapor, is now able to seize easily and quickly upon its two atoms or one atom, as the case may be, of oxygen, to form carbonic acid and water. It will be remembered that when the charge is fired, first a small quantity of the gasoline is decomposed into its constituents, carbon and hydrogen, and the individual atoms of carbon and hydrogen immediately combine with atoms of oxygen in their immediate neighborhood, the result being the liberation of a certain quantity of heat.

The heat liberated by the combustion of this small initial quantity of gasoline decomposes a further quantity of the gasoline, the carbon and hydrogen of which, in their turn, combine with oxygen, setting free a further quantity of heat, this heat decomposing a still further quantity of gasoline, and so on, until the whole of the charge is consumed. And it is here that the matter of compression, and the close proximity between the molecules, comes in.

The combustion, it will be understood from above, is not instantaneous, though it occupies such a short period of time as to be apparently instantaneous. It progresses in all directions from the point where the ignition first takes place, and requires a certain definite time to complete. If the charge is not compressed, there is a considerable resistance to the transmission of the combustion heat wave, and only a comparatively small portion of the charge is consumed, only a portion of the possible heat being liberated.

When the charge is compressed, the resistance to the transmission of the combustion heat wave is reduced, each atom of carbon and hydrogen more readily finds the atoms of oxygen to combine with, and

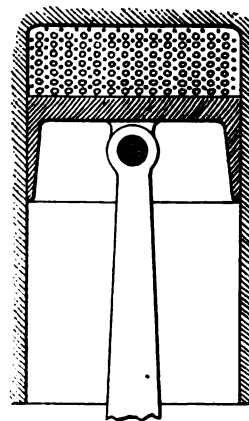


Fig. 2—Diagrammatic view of gasoline engine cylinder at the end of the compression stroke. The molecules are now squeezed together so that the atoms of C and H, when the gasoline is decomposed can easily secure the atoms of O they want for combustion.

more heat is liberated, the whole thing being more efficient. It follows therefore, that the greater the compression, up to a certain point, the greater is the efficiency of the engine, because the greater is the amount of heat liberated, in proportion to that possible.

Weak mixtures, as motorists know, act in very much the same manner as low compression. They offer a resistance to the combustion heat wave, and the atoms of carbon and hydrogen do not so readily find the corresponding atoms of oxygen.

IMPORTANCE OF THE FAT SPARK.

The importance of the fat spark, that is to say, the

spark carrying plenty of energy with it, follows as a natural consequence of what has been stated above. The firing of the charge depends upon the initial decomposition of a sufficient quantity of gasoline and the immediate recombination of the divorced atoms with atoms of oxygen, and this is only accomplished when the igniting apparatus, whatever it may be, conveys right into the charge, a considerable amount of energy. A weak spark produces bad results, misfires, and the other troubles, because it may not cause a sufficient quantity of the gasoline vapor to be decomposed to start the action.

This will account also for the proposal that has been made, and that has been carried into effect by a number of motorists, to use two spark plugs in each cylinder.

Fig. 3 shows how this would benefit the complete com-

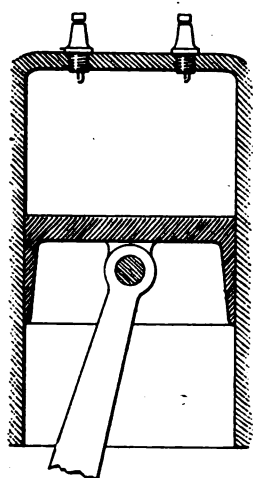


Fig. 3.—Intended to illustrate diagrammatically the possibilities of using two spark plugs, setting up two waves of combustion in the cylinder.

bustion of the charge. There are difficulties in the way of producing two fat sparks at the same instant, but if they can be produced, and they can be forced through bodies of the charge, at some distance from each other, the effect upon the combustion of the charge must be good. The two sparks, if properly applied, and if both are fat sparks, should send out two combustion heat waves, practically halving the resistance to the travel of the combustion heat wave, and halving or more than halving the time occupied by the total combustion of the charge. If it could be arranged, more than two spark plugs to fire the mixture at as many points in the cylinder as could be got at, would be an improvement.

In all of these problems, the quick burning of the charge is one of the most important factors in the efficiency of the apparatus. Quick burning means nearly always the burning of the whole of the charge, while slow burning often means the expulsion of a portion of the charge unburned. That is to say, with slow burning, the number of miles that a car will run with a gallon of gasoline, is reduced, while with quick burning it is increased.

Worn Tire Treads.

As soon as tire treads wear down until the fabric is exposed, the tire should be immediately removed and sent to the factory for retreading. Otherwise, the fabric will soon be destroyed and the tire permanently injured in consequence.

When embedded in rubber and not subjected to strains or weakened by bending, the fabric used to reinforce the tire will retain its strength indefinitely. As soon, however, as the rubber is removed and moisture from the road is permitted to penetrate, the fabric begins to disintegrate and in an incredibly short time its strength and resistance are gone forever.

PAINT SHOP GOSSIP.

Items of Interest Set Forth for the Jobber and Repairman.

BY. M. C. HILLOCK.

For the dark green surface, and especially Olive or Quaker green, a double fine line stripe of lemon yellow, glazed with crimson lake or No. 40 carmine, makes an effective color display. Chrome yellow, Naples yellow, or sulphur yellow, glazed with carmine or crimson lake, or English scarlet lake, also yield enticingly rich effects for lining work over any of the dark rich fields of green popular upon automobiles.

The jobbing painter cannot go far wrong in urging the merits of the dark greens and blues for use upon the larger and finer touring cars and limousines. Manufacturers will tell you of the great and growing popularity of these colors. Red, to be sure, is a popular color and in provincial towns, in its various shades, it is a foremost color.

In attempting to assist the automobile owner in a choice of color it is always a safe practice to urge the claims of the dark, rich colors. They retain their popularity, whereas many of the lighter colors, many of which are practically "fad" colors, are but the fleeting fancies of the hour.

The writer has recently received from "a reader" of the AUTOMOBILE DEALER AND REPAIRER, a query concerning the bulging of putty upon auto bodies. Under ordinary circumstances hard drying putty, such as the carriage and automobile painter uses, does not bulge. Putty may be forced to bulge through the contraction and expansion of the wood, or through the contraction or expansion of nails, screws, and other metal used in construction. Until these factors can be successfully controlled the bulging of putty will continue to disturb paint and varnish conditions.

Putty made of three parts of dry white lead and one part bolted whiting mixed out smooth and fine in equal parts of rubbing varnish and coach japan until it can be handled nicely without sticking to the hands will not under ordinary conditions, with a perfectly neutral base, bulge or swell out. In case the putty is stored in a quantity of water, and this medium is not eliminated before using the pigment, it is likely to cause shrinkage as the evaporation of the moisture proceeds.

To wash off the automobile top without doing it an injury whip a piece of castile soap into 6 or 8 quarts of luke warm water until a nice suds is developed. Then with a soft sheep's wool sponge, using the suds as a dipping medium, proceed to wash off all the accumulations, dust, etc. Rinse off with a second sponge dipped in clean water, after which dry off the goods with a chamois skin.

In cleaning up the under parts of the automobile, the complicated mechanism of the average car makes it unusually difficult for the painter, relying upon the poor facilities, and the ordinary methods of cleaning, to dig away and clean up the grease saturated parts. When all the accumulations have been taken off that turpentine and the putty knife, scraper, etc., will remove, add a couple pounds of sal soda dissolved in about six times as many gallons of clear water, and with an old brush saturate the parts with the solution. Then rub with soft rags or waste, wash the parts over with turpentine, and then wipe clean and bright with some dry waste or pieces of cloth or burlap. Parts from which it is impossible to get all the grease, oil, etc., coat over with a thin wash of orange shellac.

When the automobile surface, newly varnished,

floats a blue film over its face, it betokens moisture, or a paint shop insufficiently heated and ventilated in about the worst possible manner. When taken upon the early manifestation of the trouble, it is susceptible to curative methods. These consist of repeated washings with clean, cold water, subsequently drying lightly off with the chamois skin and exposing to light and air. Blooming or bluing of the finish is due to appear at any time now and the finisher may well be on the lookout for it.

All the finer and richer colors used in automobile painting require ample protection under a heavy flow of varnish, a fact which the painter should not be slow to advise the auto owner. More frequent varnishing of the car, in fact, will insure greater durability for the color and maintain its brilliancy better.

Gasoline Pipe Repairs.

There is no mishap calculated to bring more dire consequences than a broken gasoline pipe, and to this misfortune the small car, on account of its inherent vibration, is particularly prone. The burst gasoline pipe, further, is not easy of instant diagnosis for this reason, that the fracture may be in such a position that a small quantity of gasoline still finds its way down the tube to the carburetor, while the remainder pours out upon the road in which case there may not be any misfiring, but simply a falling off in power. Granting the correct diagnosis of the trouble, which, it need hardly be emphasized, requires immediate correction if the contents of the tank are to be saved, there is frequently considerable difficulty in effecting a roadside repair capable of lasting more than a few hundred yards. The writer recently had the misfortune of a fractured fuel pipe, and after going through the tool kit and odds and ends found himself without a bit of even the most humble rubber tube. Things looked very black indeed until the following idea presented itself, and was duly carried out. The rubber insulation of the high tension cable was nicked round with a knife about two inches from the end in such a way that the enclosed wire was not cut at all. The semi-detached piece was then rolled and trodden on, bent and twisted, so as to give the insulating rubber a chance to free itself from the wire inside. The insulation was then pulled off the wire, and an excellent piece of stiff rubber tube remained with which to link up the broken fuel pipe, and lasted nearly one hundred miles.

Locating a Knock.

Many a knock has been sought for in the wrong place. A knock that sounded as though a big end was loose was in reality traced—but not without a good long search—to the flywheel bolts having stretched, the said flywheel being bolted to a flange. A smart repairer who was down on this used to send the owner to look round the works, and when he came back in fifteen to twenty minutes the knock in his engine had disappeared.

If carbide has been exposed to the air and has become partly slaked, it is sometimes possible to redeem it by shaking it violently in a coarse sieve, thus removing from the outer surface of the lumps the slaked portion.

It is advisable for the new car owner to practice on the brake, and learn to estimate both distance and the speed of the car accurately before he attempts using it in crowded thoroughfares.

Before starting the motor, put about a teaspoonful or more of cylinder oil in each cylinder; also about the same amount of gasoline, because by so doing you will save blistering your hands by excessive cranking.

SPARKS AND COILS.

Mr. Hobart Discusses the Benefits of Timing With a Single Spark.

BY JAMES F. HOBART, M. E.

The article by Mr. Walker, in the September issue, in discussion of the outside spark is most interesting and was read by the writer with much pleasure, but there is one matter in the article in question which appeals to me as being in error. This is the comparison of the spark from a coil or a magneto with the pendulum. It is not clear to the writer how Mr. W. figures out the pendulum action; for an induction coil and a plain "wipe" spark coil also, can give but a single spark at a time. The "wipe" coil can give a spark only when the current is cut off by breaking the circuit, while the "jump" spark coil can give two sparks, one when the battery connection is made, the other spark when the circuit is broken. Aside from this, the coil is powerless to give any spark whatever.

The writer has found that the very best timing pos-

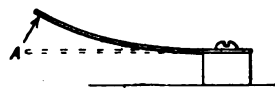


Fig. 1—Action of a spark coil.

sible is by the use of this single spark without any circuit breaker, "interrupter" or "buzzer" or whatever name may be given to the vibrating apparatus which opens and closes the primary circuit of the spark coil. Any "pendulum" action which may be fancied to exist is only the rapid alternating of the charging and discharging sparks from the induction coil. The current which comes from an induction coil is an alternating current—or more strictly speaking, the "current" is a mere series of discharges flowing momentarily in opposite directions. The spark from a jump coil, which is apparent when the primary wires are connected with the battery or other source of electricity, is not as strong as the current which flows from the coil when the primary circuit is broken.

To understand why this is so, one must study the principle upon which an induction coil works in order to properly comprehend it. As stated, there is a slight discharge from the coil when the primary circuit is completed. Strictly speaking, this is not a discharge, but a current flowing through the secondary coil to equalize the electrical tension set up in the secondary coil by the passage of current through the primary coil. When we pass current through a wire, magnetic lines of force leap out and circle around the wire through which current is passing. On the other hand. If we pass magnetic lines of force through or around a wire, an electromotive force is set up in the wire and if the circuit be completed, current will flow in the wire in proportion to the voltage induced in and to the resistance of the wire.

The current in the secondary coil depends entirely upon the turns of wire in the primary coil and upon the amperes of current in that coil. The voltage will step up or down in proportion to the number of coils of wire in the primary and the secondary coils. If there be 20 turns of wire in the primary, and 20,000 turns in the secondary, then it is safe to say that when one ampere of current under one volt pressure is sent through the 20-turn coil, that 1,000 volts tension will be manifest in the secondary coil when the primary circuit is broken. Consequently, when 10 volts are turned into the coil, with its accompanying 10 amperes of current, 10,000 volts will surge past the spark gap when the primary

circuit is broken, neglecting the slight resistance of the primary coil.

But there is no current flowing in the secondary coil as long as current flows steadily in the primary. If the voltage of the primary current does not fluctuate either higher or lower, then the secondary coil will be dead as if there were no current within a mile of the secondary. But fluctuations of current in the primary will cause slight currents in the secondary coil—provided the terminals of that coil are connected. If they are disconnected, no current can flow, but an electrical tension, or electromotive force is induced in the secondary, of a certain direction when the current is increasing in the primary and of opposite polarity when the current in the primary is decreasing. But as these slight potentials are not strong enough to jump the spark gap, hence they are not seen at the spark plug and no current flows.

The above description applies to a transformer such as is used in electric lighting to reduce high tension currents to low tension "juice" of 110 to 220 volts which may be safely used in lighting. But only alternating currents may thus be used. The direct (continuous) current will not work a transformer for the reason stated above, viz.: That no current can flow in the secondary coil while a steady current is flowing in the primary coil. It requires an alternating current to operate a transformer, and if an ordinary jump spark coil be placed in an alternating electric light circuit—placing a proper resistance in circuit to prevent burning out the coil or the fuses in the light circuit, and the secondary coil, with its terminals properly arranged, it will give out sparks enough to work a small wireless telegraph in pretty good shape!

It will be found that the coil will not give a spark of any value when an incandescent lamp is placed in series with the coil to prevent its burning out. The reason for this is that only about three-tenths of an ampere of current can get past the lamp, and the very small amount of current is not large enough to "fatten" the spark to a useful point. A resistance which would permit a few amperes of current would fill the bill and current would flow in the secondary coil in accordance with the ratio of the windings.

There is one thing which affects the voltage of the induced or "secondary" current, and that is: The amount

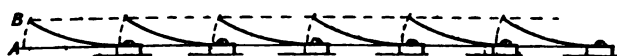


Fig. 2—Spring-like action of coil.

of soft iron wire in the induction coil core which has much to do with the amount of tension induced in the secondary coil. Without any soft iron core the action of a transformer or of an induction coil would be very slight and there would not be results such as are obtained with plenty of soft iron in the core.

The above described results are for the transformer action of a coil in which an alternate current is doing a continuous performance. But in the spark coil, for both wipe and jump, there is another factor to be considered in obtaining the greatest possible spark from the coil. If the break in the primary circuit be made slowly, the spark will not be nearly as intense as when the wires are pulled apart very suddenly.

Thus, the time occupied in breaking the primary circuit becomes a factor in the equation, and to determine the intensity of the secondary spark, we must not only multiply the voltage of the impressed current by the ratio between the windings of the primary and secondary coils, but we must also divide the result thus obtained by the fraction of a second in which the wires are separated

beyond arcing distance. Were the winding and voltage of coils and the primary current sufficient to give a secondary current of 10,000 volts, with a certain speed of the buzzer, that voltage would be nearly doubled by using a buzzer or interrupter which broke the circuit in one-half the time! This, however, is understood to be limited by the time-factor of that particular coil, and nothing will be gained by using so speedy an interrupter that the current does not have time to properly charge the primary coil. It requires a certain length of time to send forth the lines of force and unless the primary current is continued long enough to fully energize the core and coil before current is cut off, the full induced voltage can never be obtained. Therefore, do not change the length of the buzzer spring in hopes of doubling the power of the spark, for the limit may have been found by the designer of the particular spark coil under discussion. The length of time in which current can pass through the windings of a coil and magnetic lines of force leap out and induce a current in the secondary winding is short

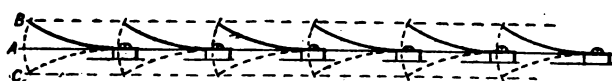


Fig. 3—Spring pendulum action.

—very short indeed, but the length of time is measurable and is absolutely necessary to the proper action of the coil.

Indeed, the action of a spark coil may well be compared to the action of a spring, as shown by Fig. 1. The action of the primary current is represented by the arrow which is forcing the spring upward. This action continues as long as current is maintained of the same strength in the primary coil. There is no action in the spring as long as it is held up by the arrow. But as soon as the (current) arrow is removed, the spring immediately jumps to the position shown by dotted lines at A. In the case of the spring, it drives against whatever object may chance to be at A, and then remains there, at rest until another flow of primary current tensions the spring up again.

When the primary coil is energized, the passage of magnetic lines outward causes current to flow in the secondary coil as described above, but it is when the current is cut off, that the snap of the electric spring is felt, and the very sudden driving inward again of the magnetic lines, causes a very sharp flow of current in the secondary coil. The action might well be compared to the discharging of an arrow from a bow. The force of the hands pulls back the string and bends the bow, and holds it in tension until the time comes for its discharge when the sudden release causes the (current) arrow to be hurled forward with tremendous velocity.

In the case of the spark coil, the magnetic spring is compressed by the primary current which pulls back the magnetic lines and holds them steady as long as current flows in the primary. But when the bent bow of magnetic lines is suddenly released by cutting off the primary current, then the magnetic bow snaps back into place, driving the spark arrow through the secondary winding of the coil with great force and suddenness.

Thus instead of being a pendulum action, the action of the primary current is more like the repeated lifting of the spring as shown by Fig. 2. The primary current drives the lines of force from level A, to level B, and the retreat of the lines from B, to A, drives the igniting current through the secondary coil. Incidentally, there is a slight reversed current also established in the primary coil also which is manifest in the heavy spark which occurs when the primary circuit is broken to let loose the igniting spark. It is this retreat of the magnetic-force-

spring which causes the spark when "make and break" ignition is used. Then a much heavier primary coil is used, but it is the retreat of the magnetic lines of force: The "magnetic kick" which causes the heavy spark in either case.

The distance apart of the spring actions in Fig. 2, represents the speed at which the circuit breaker operates. If the speed be too great, as noted above, the volume and intensity of the spark will suffer as will be further explained below. Were there a "pendulum" like action of the spark, then the situation would be something as depicted by Fig. 3, the spark vibrating between B, and C, instead of stopping at A upon its recoil from B. That this is not the thing which takes place, will be shown later.

It was stated at the beginning of this discussion that the best timing possible is secured by a single spark without the use of the buzzer or vibrator which makes and breaks the primary circuit. This action is graphically represented by Fig. 4, in which the action of a single break is represented at A, B, the magnetic lines having full opportunity to return to zero in an unobstructed manner, thereby driving home the strongest possible secondary current. If the primary circuit be opened and closed by hand, it will be noted that a much fatter spark can be obtained at the spark plug than is ever obtained by the use of the vibrator. Why this is so will shortly become apparent.

The sharp, sudden single break of the circuit gives the

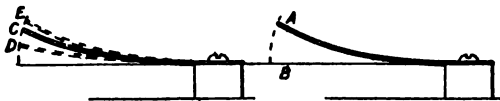


Fig. 4—Damping action of too rapid sparking.

clean-cut reaction repressed at A, B, Fig. 4, but when the vibrator does the work, it is with such rapidity that the spring may not have time to reach quite to zero—level, B, before another impulse from the primary current sends the magnetic-force-spring skyward again. This action is shown at C, where the "magnetic" spring retracts only to D until it is met by a fresh primary current impulse and is so prevented from delivering its full quota of secondary current.

Furthermore, the action is so deadened and retarded by vibrations too rapid for the winding of that particular coil, that by the time the magnetic spring has reached E, the impulse derived from the primary current has been exhausted, or counteracted by the returning secondary lines of force—so to speak—which remark is not technically accurate but serves to illustrate—and the tension of the magnetic spring is never raised to the full force, but is headed off at E, and begins to drive back the secondary current, only to be again arrested in this at D, by the returning lines of force from a fresh primary current impulse.

Possibly it is this action which Mr. Walker designates as the "pendulum" action, in his communication. But, be it called "pendulum" or "spring," it is in every instance detrimental to the action of a coil and can only result in a decreased-power-spark at the plug. The remedy, then, is obvious: So adjust the vibrator that it works at such a frequency as will give a full and rich spark at the plug.

Furthermore, the manner in which the break in the primary circuit is made has much to do with the quality of the spark, both in "touch" and in "jump" sparks. This is the result of the speed of break in the primary circuit, as was noted in a preceding paragraph. It is for this reason that a limber spring in a vibrator gives a better spark than a stiff spring can possibly put forth. And

it is for the same reason that a "wipe" contact gives a better spark in make and break ignition than is obtained from a plunger-pin movement.

Another thing militates against the strength of a spark, and that is—the gradual increase of resistance in the make and break mechanism at or just before the instant of breaking the primary circuit. In every case, the break must be sudden and clean in order to obtain the best spark possible. It is for this reason that the condenser is used. That device takes up the spark which would otherwise linger a fraction of an instant at the break of the circuit, and the time which this spark, or minute arc lingers, is just so much increase in the time of breaking the primary connection, hence the secondary spark efficiency is diminished accordingly and the ignition suffers in consequence.

This means that the armature, or the hammer of a vibrator, or the moving contact in a "touch" spark outfit, should in all instances bear fair and square upon the other contact. When either is found to fit in such a manner that the spring moves partially away from the other contact and only bears on one corner or edge at the time of the final break, then full results will never be obtained from the arrangement, be it "touch" or "jump" spark ignition.

See that the contacts bear fair and square, not only at the beginning of the movement, but at the ending particularly, and during the entire period of contact also. This being secured, together with slow enough vibration to ensure that the currents and lines of force will not "fall over each other" or "do the pendulum act" or any other "stunt" and you may rest assured that the best possible results will be secured from the ignition system, whatever its type may be, providing of course that the matters of battery, connections and clean terminals are as they should be.

Spark Plugs.

In changing from one style spark plug to another in all motors having more than one cylinder all the plugs should be renewed with the same style as very few plugs on the market are of the exact size. You may lose a small amount of compression with one make of plug while you gain compression with another. When all the plugs are the same style and size each cylinder should have the same compression as far as the plugs are concerned.

The writer had occasion, a short time ago, to look at a motor with which the owner was having considerable trouble with the No. 2 cylinder. The vibrator had been readjusted and the party had tried all sorts of experiments with this cylinder in order to make it give the same power as the other three. In looking over the motor it was found that No. 2 had just been equipped with a new spark plug of an entirely different style from the other three plugs. The new plug was much smaller and as the thread was not cut so deep it was screwed tight more quickly than the old plugs which were longer in construction and the threads had become worn which allowed the plug to take up more room in the cylinder. The new plug was removed and the old one cleaned thoroughly and replaced and it was then found that No. 2 cylinder gave apparently the same power as the other three.

Heated Tires.

Tires frequently become very much heated during a long run. This may be largely eliminated by rubbing a good quality of finely pulverized talc on the canvas of the casing and over the inner tube before it is inflated.

A CHOKED JET.

Why It is Sometimes Difficult to Detect the Offending Atom.

On the subject of carburetors, I wonder how often a series of annoying stops following quickly upon one another have been brought about by such a cause as in a case I came across last week.

I was chatting with a car driver in a garage where I was taking in gasoline, and he told me that his car was at that moment being attended to in order that a carburetor trouble might be put right. He said that all the symptoms pointed to a choked jet, but that he had failed himself to find the offending atom, either in the jet or in the body of the carburetor. He had been pulled up on the road several times, and had only just managed to crawl into the garage.

While we were talking the mechanic had taken the carburetor down and to pieces. He examined the jet, etc., and declared all clear; the owner of the car also examined it again, but failed to detect any possible cause of obstruction. However, a third individual who was standing by (modesty forbids me to mention his name) was sufficiently curious to peer through the jet too, holding it up towards the light and examining it from both ends. There was something in it! Not in a direct line of vision, but "round the corner," so to speak. A carburetor jet, perhaps you have noticed,



Out of the line of vision.

has, or the majority have, a comparatively large bore for the greater part of its length, the small diameter which regulates the flow of the gasoline extending for about an eighth of an inch only. The two bores merge into one another by a taper formed by the tip of the drill used for making the large bore, and if you will examine the sketch herewith you will see how it is possible for a piece of grit or waste to escape notice unless care is taken when searching for some obstruction.

In the instance under notice there is no doubt that when the engine was pulling and using a large flow of gasoline the offending atom would move out into the smaller bore, receding again when the engine was throttled down, and remaining so when the carburetor was emptied for examination. But apart from all theories as to what happened when the engine was running, there was the cause of the bother without doubt.

When a Nut Breaks Off Short.

If a nut breaks off short in a casting or other part of the car, the best way to go about its removal is to drill a hole in the center of the part broken in. This hole should be of a certain size, depending on the diameter of the stud. For a $\frac{3}{8}$ -inch stud a bare $\frac{1}{4}$ -inch diameter hole should be drilled, care being taken to drill right down the center of the stud so as not to damage the thread. A flat-nosed drill should be used, and should be ground so that it only cuts when rotated in the left-hand direction, and not in the right, as the usual drill is ground. The reason for this is that if the stud thread be at all slack rotation of the drill and the cutting action will tend to screw out the stud, which will very often come out readily before the hole is drilled very far. If the stud does not come out as de-

scribed, then, after the hole is drilled through it, a square reamer is lightly driven into the hole. A lathe carrier is fixed to the top of the reamer and the stud twisted out by rotating the carrier anti-clockwise. If the drilled part is very fast and then will not readily come out, the only thing to do is to chip the broken part with a sharp round-nosed chisel. This usually has the effect of cracking the skeleton of the stud, and the pieces can be fished out of the hole with a piece of bent wire.

Wear of Tires.

Two tires of the same make and quality fitted at the same time and both fitted on wheels that revolve on the same axle do not necessarily wear out exactly at the same time. The reason for this is because they do not necessarily do the same work. In the first place the track followed by each tire may not be the same in smoothness. A preponderance of ruts, nails, glass or sharp stones may by chance be on one side of the road. But even though the road surface is equal on both sides, the tires will not always wear evenly.

This is because the contact with the road is not solely responsible for the uneven wear of tires. The construction of the car has a good deal to do with the matter. So also has the way in which the car is driven; and the amount of care that is devoted to each tire must also be taken into consideration.

If the car body is badly slung, or the wheels are not parallel, abnormal friction will be developed between the tire and the ground.

The number of obstacles, such as ruts, stony patches, nails, chips of flint, and even curbstones, encountered by the right-hand tire may be much greater than that with which the left-hand tire is brought into contact. At any rate it need not be exactly the same. Then again, the load on the car may be unequally divided. Very often—in most instances, in fact—the place beside the driver is left unoccupied.

Moreover, the rule of the road is "keep to the right"—and the center of the road is usually higher than the sides. That means that you are running on an angle, and that the center of gravity of your car has been displaced. All of which is having its bad effect on the tires—and, as we have suggested above, the weight in the car is probably unevenly distributed. When the car turns a corner, the tire making the outer curve is subjected to by far the most severe strain.

When the brake is out of order, and acts with unequal force, the tire on the wheel least controlled is, of course, not nearly so severely strained as the other. If one rim is in a bad state, the cover fitted to it stands far less chance of giving good service than that upon the other—if the other is a properly cared-for rim.

One cover may have become spotted with grease or oil, which ruins rubber; or the car may often be left standing for a long time with one of its wheels in a gutter, thus allowing water to penetrate all the small cuts. The water will eventually work its way through to the canvas, and perish it. Then the cover will, one day, burst—and its owner will wonder why!

Finally, one of the tires may have been travelling insufficiently inflated for a long time. Fully seventy-five per cent. of the cases of premature decay are due to this fault alone.

When two tires, alike in type and quality, are fitted at the same time and are used on the same axle, their failure to give exactly equal terms of service does not imply that one of them is in any way weaker than the other. It simply means that one tire has been luckier than the other.

TROUBLE DEPARTMENT.

Questions answered by the Y. M. C. A. Automobile School, 323 West 57th St., New York.

This department is intended to be a "trouble clearing house," and it will be esteemed a favor if our readers will add information to it from their own experience or knowledge.

Faulty Water Circulation.

Question:—Would you kindly advise me through the trouble department of your paper as to the following trouble with a one-cylinder Cadillac: I cannot get the water to circulate. Have taken pipes apart and radiator and pump off and forced water through with a force pump. All seem to be clear, but when put together and engine started, water soon boils in the water jacket and the pipes as far as the top coil of the radiator, the other coils remaining cold. The top coil of the radiator gets warm only after the engine has become very hot. Have put on a new pump, but with no better results.

Answer:—If you are sure the pump operates properly, there is no doubt a clog in the system somewhere. The approximate location of the stoppage may be ascertained by following the line leading from the bottom of the tank or radiator and breaking each connection in turn to see if the water runs freely by gravity. The inside of the hose connections will sometimes curl up and thus clog the pipe and all of these connections should be examined carefully.

Cylinder Lacks Power.

Question:—We are the owners of the Northern Automobile and are having a little trouble with one of the cylinders. The trouble is this: The cylinder fires all right and appears to have good compression, yet when we short circuit the other cylinder it fires all right but has no power. What do you think the trouble is?

Answer:—See that the gaskets are tight on the inlet manifold. If one gasket allows a little air to leak into the pipe it will cause a difference in the mixture going to the two cylinders.

Examine the commutator and see that it is not worn so that one cylinder receives the spark a little earlier on its power stroke than the other. If vibrating coils are used, see if more life cannot be gotten out of the weak cylinders by putting more tension on the vibrator of the coil controlling that cylinder.

Two-Cycle Engines.

Question:—Kindly tell me are the two-cycle engines such as used in the Elmore cars considered a success from a scientific point? If so, why are not more of them used, being so simple?

Will a two-cycle engine develop as much horsepower, bore and stroke being equal, as a four-cycle engine? Does it use more gas?

Is there any publication on the market giving actual test H. P. of the various motors used in automobiles?

Answer:—Yes, the Elmore two-cycle engines are considered a success from a scientific point of view. It is hard to say why there are not more of them being used. It is probably more a case of personal opinion than anything else, but they have proven very satisfactory.

The two-cycle engine with bore and stroke equal to a four-cycle engine, will develop about 25 per cent. more power, but naturally will consume a little more gasoline.

There are no publications on the market giving

actual tests of horsepower for the various motors used in automobiles, to the knowledge of the writer. However, there are on record tests that have been made by the Automobile Club of America. For a copy of the results of these tests it would be necessary for you to make application to the A. C. A.

Size of the Radiator.

Question:—I have a model E single cylinder Rambler cooled by thermo-syphon, radiator tank being placed on engine tank always leaks more or less owing to excessive weight and jolts on rough roads. So I wish to replace it with a radiator. What size radiator shall I use? Should think the standard tube type used on the old Cadillacs between frames might do, but would it cool without a pump? Water always boils under present arrangement, but it does not affect running unfavorably. I wish to avoid a pump, as it will be hard to install. If pump be indispensable what output do you recommend? Present circulation is through one-inch piping.

Answer:—We do not care to recommend any particular make of radiator, but you are safe in using most any standard make of such size as the maker would specify. You should get very good results by installing the radiator between the frames and using the thermo-syphon system. You are perfectly right in trying to avoid the use of a pump on your machine.

Cause of Tires Bursting.

Question:—For the past year or two I have been reading your paper and have noticed from time to time the numerous automobile accidents that have occurred from the bursting of one of the tires. I have had this experience but once, and then it was just after having crossed a railroad track and my car was going at a very slow rate of speed. There was no damage with the exception of the tire. What I would like to know and I would thank you for the information, is what causes an automobile tire to burst and what should be done to prevent such an occurrence? A personal reply or an answer through the columns of your journal would be greatly appreciated.

Answer:—The cause of the bursting of automobile tires is due to some weakness in the construction. The weakness may occur during its manufacture, by being cut or injured in some way while traveling along the roads, or by natural wear. It must be remembered that there is a very heavy pressure inside of these tires and that should they receive a very heavy or sudden shock, the pressure is suddenly increased many times the original pressure, and the giving away of the fiber or rubber, or both, may occur at any time. The structure of the tube must be exceedingly strong and it is impossible to make a tire that can stand all kinds of shocks that may be received.

Timing the Spark.

Question:—Something for your query column: Of all the books that I have consulted in regard to "Timing the Spark," one says with jump spark the buzzer should work just before the piston reaches the top. Now is that the extreme advance position or the extreme retard point? I have several good books but none enlighten me on that point, neither have I seen the question asked or explained.

Answer:—At the extreme retard position the spark should occur some time after the crank has reached the top center point, to avoid a kick back when cranking the engine. At the extreme advance position the spark may occur anywhere from 0 degrees to 60 de-

grees before the dead center, depending upon the design and speed of the engine.

A very convenient, and at the same time a very accurate, method of timing the spark is to first get the piston to the top of the cylinder with the crank on top dead center. Then advance the spark control lever on the sector 1-3 of its range and moving the contact point of the spark timing device in the direction it turns when the engine is running, bring it to the point where the vibrator begins to buzz. Then fasten contact point to shaft which drives it. This will allow of advancing the spark 2-3 and retarding the spark 1-3 from top center position. In cranking the engine the spark control lever should be less than 1-3 advanced.

A Cylinder Trouble.

Question:—I own a Jackson car, Model C, five-passenger, 2-cylinder. It seems to run all right till I start to go up grade, then it misses and blows out through the carburetor for a time or two, and then it will take hold and pull all right, and so on. The front cylinder skips when standing still with just the engine running. I have washed the cylinder with kerosene and have changed the carburetor, and the wires are all right, and the spark plugs seem to be all right. The car hasn't run over a thousand miles and has always been taken good care of. Please answer through your trouble department.

Answer:—Your trouble is no doubt faulty carburetor adjustment. As the engine misses when you start to go up a grade, we would judge that the tension on the auxiliary air valve spring is not great enough. There may be a partial stoppage in the gasoline feed pipe between the tank and the carburetor that would cause an insufficient supply of gasoline for hill climbing work.

A Dented Radiator.

If the radiator becomes battered or dented, here is a way the dents may be removed "on a pinch."

Remove the radiator and place it so that the damaged portion is in a horizontal position, and next carefully "tin" the dent with a soldering iron in the usual way. Over this must be soldered a piece of thick sheet brass, into which a strong hook or eye has been previously fastened. If the soldering has been properly done, it will be possible to draw out the dented portion by pulling the hook until it is flush, or even bulges slightly from the surrounding casing. All that then remains to be done is to unsolder the pieces of brass with the hook attached, and to remove the adhering coating of solder from the place where the dent was. To remove all traces of solder without leaving scratches in the brass casing, a file should not be used. While the surface is still hot enough to cause the solder to remain liquid, the latter may be nearly all wiped away with a cloth, only a very thin coating remaining to be dealt with. If there are no lumps at all, a little emery cloth of medium grit will soon cause all traces of tinning to disappear, when the final polishing can be continued with fine emery cloth, and afterwards by means of polishing paste. Should, however, it happen that the solder is of any material thickness, the quickest way to remove it (other than by reheating and wiping) without leaving scratches, is by means of a scraper.

For Cleaning Gloves.

An excellent solution for cleaning motor gloves with practically no deterioration, consists of one drachm of sodium carbonate in one quart of milk.

Tire Pressure.

The maintenance of the correct pressure in tires seldom receives the attention it deserves. It is really impossible to secure the best results unless the tire pump is provided with a gauge in good working order. No hard and fast rule can be laid down for the pressure per square inch to be pumped in—so much depends on the size of the tires, and the weight of the car, as well as the make of the tires. From 70 lbs. to 90 lbs. per square inch may be accepted as the average pressure necessary. There should be no decided bulging of that portion of the tire in contact with the ground; and if on forcing the wheel sideways, by pushing the upper part, the under part is observed to sway, it is a sign of insufficient pressure.

Save Your Gasoline.

After filling the gasoline tank and then taking a short ride you may be surprised the next time you take your car out to find you have little gasoline left in the tank while you should have a large supply. Do not immediately come to the conclusion that your motor burns too much gasoline.

The trouble may come from a leak in the feed pipe or the carburetor. As gasoline evaporates very quickly it is often difficult to locate very small leaks as the gasoline will evaporate before sufficient amount has leaked out to cause a drop to form. A constant leak of this nature will soon empty the supply tank.

When you enter your garage after a run if you make a practice of shutting off the cock on the feed pipe near the tank you will save a considerable quantity of gasoline which might leak out in the manner described. Do not fail to look over the seams and corners of the supply tank occasionally as the vibration the tank is compelled to stand when running on low gear will cause rivets to become loose. When you see rivets in heavy steel structures become loose, after being driven hot with pneumatic hammers, caused by vibration, you can readily realize the effect of vibration on the small rivets of your gasoline tank.

Explosions caused by a leak in the gasoline tank seldom occur when a car is in motion but after your car has been standing a short time, or even when the motor and exhaust pipes are cold, the gasoline on the bottom of the tank which has leaked out may form just the proper mixture under the car to cause a terrific explosion when the first charge is fired through the muffler. Too much attention cannot be given to this part of your car as one explosion may wreck your car completely and cause serious personal injury.

Glossit.

From W. M., New York.—In looking for a cleaning and polishing liquid for my car I found on the market a liquid called "Glossit" which will do exactly what the name implies. A small amount of this liquid will take the cloud from the varnish and polished surface of the car and leave it like the finish on a piano. It also protects the surface from rain. After washing the car I give it a good rubbing all over, including the leather cushions with "Glossit" and the result is a clean polish with no odor.

I will add that I am not interested in the manufacture or sale of this article in any way whatever but I believe that if a good article is found others should be told about it.

An occasional glance under the car, when it is at rest, with the engine stopped and the gasoline still turned on, may prove profitable.

THE JUMP SPARK.

Its Construction and the Conditions Under Which it Operates.

It is generally supposed that a jump spark coil consists of a core of soft iron wires, surrounded by a primary winding of comparatively few turns, which is surrounded by a secondary winding of relatively a great number of turns, and a vibrator for interrupting its circuit and a condenser for absorbing the extra current of induction, as it is called, or the spark at the points. This definition seems to pretty thoroughly cover the average man's idea of a jump spark coil. It looks simply and would be if this constituted all that there is to a jump spark coil for ignition work.

The automobile industry, as well as motor boat and stationary engines, to a large extent owe a great deal of their present high stage of development to the jump spark coil. It has brought the automobile industry from nothing up to its present standard of efficiency.

Practically all automobiles have reasonably low compression and use mixtures quite rich in gasoline vapor; for economy of fuel in the automobile art has not been considered a necessary factor, and it has been sacrificed in order to obtain greater reliability with inefficient and poorly constructed ignition systems used.

To familiarize ourselves with the indispensable but much abused spark coil, let us analyze it, pull it to pieces and see what it is built out of, how it is built, and why. We will begin by naming the various component parts of the spark coil and then designate their true function.

The iron wire core consists of a bundle of soft iron wires and occupies axially the central position in a spark coil. The iron wire used should be extremely soft and possess great magnetic conductivity and the property of instantaneous and complete demagnetization.

The function of the iron wire core is to receive from the primary winding and store up in the form of magnetic energy the electrical energy that is applied to the primary winding.

The primary winding consists of a few turns of heavy, well insulated copper wire of high conductivity. In the usual coil it consists of from 200 to 300 turns of wire.

The function of the primary winding is to receive the battery or magneto current and circulate it around the iron wire core, so as to charge it with magnetic lines of force. Furthermore, it has an additional function in acting as the primary winding of a transformer when operating under the condenser discharge and producing a secondary spark in the secondary winding. We will speak more of this function later on.

The secondary winding consists of a great many thousand turns of very fine silk insulated copper wire and surrounds the primary winding.

The function of the secondary winding is purely that of a transformer, as it multiplies the voltage of the primary winding and at the same time reduces the amperage of the primary winding in a ratio entirely dependent upon the number of its turns, as compared to the number of turns in the primary winding. For instance, if there are one hundred times as many turns in the secondary winding as there are turns in the primary winding, then there will be one hundred times as many volts in the secondary winding as the condenser discharge delivers

to the primary winding and conversely one hundred times less amperage in the secondary winding than there are amperes passing through the primary winding, due to the condenser discharge.

The vibrator of a spark coil consists of a stationary electrode which is tipped with a platino-iridium point and a movable or vibratory electrode which consists of an iron wire core and is held by spring tension away from the iron wire core and keeps its own platino-iridium contact in firm contact with the platino-iridium point of its stationary member.

The function of the vibrator is purely that of a circuit breaker. It simply breaks or interrupts the primary current and stops the flow of primary current when the iron wire core has been charged sufficiently strong with magnetism to produce a satisfactory secondary spark.

The condenser consists of a number of alternate layers of tin foil and mica, or tin foil and properly prepared paper. So many of its sheets, we will term, are positive and are connected together and lead to one electrode of the vibrator. An equal number of its sheets are negative and are connected together and lead to the other electrode of the vibrator, but are insulated from the positive sheets by means of mica or paper. Throughout the entire condenser there is alternately a positive sheet and a negative sheet, thus making these sheets intermesh with each other, and at the same time be thoroughly insulated from each other.

The function of the condenser is not, as commonly supposed, merely to stop the sparking at the platino-iridium points when they interrupt the current. True, it performs this function, but merely incidentally. Its true function is to receive the kick of the coil, thus receiving and storing the impulses of electricity generated in the primary winding by the rapid demagnetization of the iron wire core upon interruption of the primary current, then instantly surge or throw this largely increased amount of electrical energy through the primary winding.

In summing up the action of a spark coil, we are brought face to face with the enormous importance of the condenser and the large part it plays in energizing the coil and producing the spark. Without the action of a condenser it would be impossible to produce a jump spark of sufficient intensity to ignite the charge.

The spark produced by a single interruption, while it looks just like one spark, if split up and analyzed, will be found to consist of several sparks; the first one will be the largest, representing the first surge of the condenser through the primary winding, and each succeeding one smaller. In other words, the oscillation dies out just as would the oscillation of a pendulum.

The greatest problem in spark coil building is to so proportion the condenser and windings and so build the coil that there will be just as few oscillations of the condenser as possible, thus giving to each oscillation a greater amplitude, causing a larger spark more dynamic in its character and of greater heat value. With an improperly proportioned condenser and improperly insulated windings, the condenser discharge becomes very rapid and consists of a large number of small oscillations, which produces a static spark in the secondary winding, which has no heat value and is consequently worthless as an ignition spark.

It is absolutely impossible to make a jump spark coil that will shoot compressions of from 135 to 150 lbs. with thin mixtures and do it with a dynamic

spark where one end of the secondary winding is grounded. I therefore recommend for such work the use of two spark plugs per cylinder and the bringing out of each end of the secondary winding of the coil to these plugs. When used in this way it is easy to construct a jump spark coil that will give you a dynamic spark of intense heat and of sufficient voltage to puncture any compression and to shoot any mixture, no matter how thin or how high its electrical resistance.

PUTTING THE CAR AWAY.

Things to Be Done to Insure Its Good Condition When Taken Out.

In most places automobiles are now used the year round, snow being far less of a hindrance than it was formerly supposed. But in some localities where snow lies on the ground for several months, or where for some other reason the car is to be put away for a long rest, it is well to do it the best and easiest way. The first thing to be done is to remove the cushions, aprons, horn or bell, and all the tools and spare parts. The battery should be taken from its box, and it is well to remove the coil and all the wires connected with the ignition system. A sketch should be made showing the method of wiring, so when these parts are replaced you will have a guide, for it is easy to forget the terminals to which particular wires should be connected.

The engine cylinders should be well washed out with kerosene, followed by a little gasoline. This treatment dissolves any oil on the walls or piston, and prevents the oxidation of the oil if it is allowed to remain. As to painting the engine, a coating of vaseline will answer. Particular attention should be paid to the exposed portions of the valve stems, since if they become at all rusty, they are liable to stick and cause trouble. These should be well coated with vaseline. The accumulator should be tested, and if found to be below its full voltage it should be recharged until this voltage is attained. The acid should then be poured out from the cells, which should be thoroughly washed out with clean rain water so as to remove all the acid, and they should be afterward filled up with pure rain water to a point the height of a quarter of an inch above the top of the plates. The india rubber stoppers should then be replaced. The terminals also should be carefully washed to free them from all the traces of acid. They should be wiped dry, and given a coat of vaseline. Cells filled with a semi-solid electrolyte, it is impossible to subject to the above treatment, and as the acid cannot be removed from the cell it is necessary to have the accumulators recharged every six weeks at least. A small four-volt lamp should be connected in the circuit, and should occasionally be allowed to remain lighted for a period of about an hour to enable the accumulator to discharge itself to a slight extent. This helps to keep the plates in order.

The induction coil should be put away in a dry place, and out of all danger of being subjected to high temperatures and protected from moisture. The reason for this is that paraffin wax is used as an insulating material, and if this substance becomes sufficiently heated to melt, the insulation might be entirely lost and the coils ruined. Cold, so long as the atmosphere is dry, does not injure the coil.

The pins, joints, and connections should be oiled. The wheels should be jacked up and removed from their axles, these and the axle boxes being cleaned and well greased before replacing. The anchored ends

of the carriage springs, and the shackles on the free ends, should also be well greased. Where chain-driving is employed, the chains should be removed from the sprockets and cleaned in kerosene, after which they should be immersed in melted tallow and be allowed to remain in it for several hours. At the end of this time, hang them up to allow the superfluous grease to drain off.

The clutch should be withdrawn as far as possible, and its surface cleaned with gasoline, after which it should be given a coating of castor oil. The application of clutch dressings is useless unless the clutch leather is in a condition to absorb some portion of the dressing when it is applied. An application of gasoline with the use of a brush will bring the clutch leather to a state in which it may be successfully treated. See that the clutch does not slip or grip too tightly. If interconnected with the side brakes, pay particular attention to the adjustment, since it requires very careful checking to act properly.

Next go over carefully all the metallic parts of the frame and of the connecting rods used in conjunction with the steering gear, change-speed gear, and the brakes. Where the paint has been worn sufficiently to expose the metal, this should be rubbed bright with a piece of emery cloth and paint or air-drying enamel applied, giving it at least two coats of either. All plated or polished parts should be given a coating of vaseline after they have been thoroughly cleaned and polished. Pure vaseline is distinct from the commercial article which is not so pure, containing as it does salts, which are highly injurious to nickel or silver-plated parts, whereas the refined vaseline, which may be obtained of druggists, has no effect upon them. The greased bright parts should be cleaned with a piece of rag which has been soaked in kerosene. The dirt should be scraped rather than rubbed off, as rubbing is liable to cause scratches.

If the mud of many months be allowed to accumulate over the vaseline, it will do no harm, for it bears the same relation to the greased surface as the hair to a rabbit's skin; you cannot remove the one without the other.

The lubricators should be drained of any oil which they may contain, and should be thoroughly washed out with kerosene. Where sight-feed lubricators or other patterns are used which necessitate the using of lengths of copper pipe to convey the lubricant from its receptacle to the bearings, such pipes should be removed, and should have kerosene passed through them. For this purpose, a syringe is the best instrument to use, as the cleaning fluid can be passed through the tubes at a pressure which will insure any obstruction caused by the congealing of the oil, or by any other causes, being swept away. If this is attended to carefully and the pipes are reconnected, when the car is taken out again all that is necessary for the good working of the car is a good rubbing and the addition of lubricating oil.

Weak Brake Rods.

Brake rods are sometimes weakened by threading of the ends, and occasionally are known to snap off when a sudden strain is put on them. In the event of such an occurrence, a piece of stout wire, or even rope, will serve as a temporary substitute. The broken rod ends should be removed, after which the ends of the wire or rope should be passed through the spring holes and secured. When the repair has been completed it should be tested thoroughly before starting the car, to make sure that the brakes will hold before the pedal or emergency lever reaches the end of its travel.

Protecting the Feed Tank.

From A. L. Girard, Massachusetts.—A motorist brought a car to me last week and asked me to convert his pressure-fed gasoline supply into the gravity system, stating that his pressure tank, set in the normal position low down under the back axle, possessed no false bottom, and was always being damaged by stones, so that on three separate occasions the car had been towed to a repair shop. Probably many of the pressure feed tanks in use have no false bottom or other protection, and are subject to similar accidents when rough roads are being traversed, and small, sharp stones are flung about by the rear wheels. I resolved to save him the expense of so radical and inconvenient a conversion, and procured a sheet of perforated zinc of such dimensions that it snugly covered the tank, its facing edges running across the tank from end to end. I cut slots in it to permit the piping and filling stopper to emerge, and arranged these orifices in such positions that the ugly joint came on the forward side of the tank, where it was absolutely invisible. I then got a harnessmaker to rivet several thick straps of stout leather across the sheet of zinc, so that it stood out about $\frac{3}{4}$ in. from the metal of the tank, padded out by the leather on its inner side. A couple of stout straps with buckles were then riveted to the outer side, by which it was fastened tightly around the original tank, and it was finally painted to match the color of the car. The total cost was about \$3. The tank is now as reliable as the most expensive type with an internal false bottom, and is immediately detachable for occasional cleansing.

One View of Solid Tires.

By all means, give us both sides. Here is what one expert says of solid tires: "The advantages of solid tires are more imaginary than real; they chip easily. One and-a-half inch tires especially wear out rapidly; 700 miles is their very longest life; two-inch tires of course last a little longer. But the assertion of the manufacturers that they are good for 11,000 miles is a

table. Riding, especially on hard roads, is very much less comfortable with solid tires. On sandy roads high wheels are impossible; on muddy hills they slip and the driver gets stalled if he will not take the trouble to wind ropes around the wheels or use chains. And finally a high-wheeler is very much more difficult to handle than a pneumatic-tired machine and can never be speeded up like the latter. Concerning the cost of up-keep, careful records show that the difference is not great. In most country towns there are no facilities for putting on the solid tires and one has to ship the wheels away, which adds to the expense and waste of time."

Paint the Rims for New Tires.

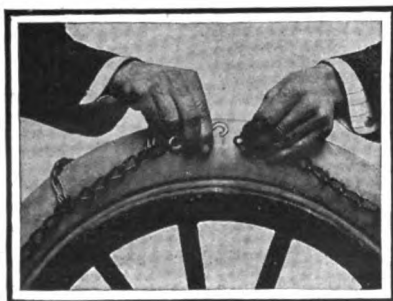
To put tires on rims which need painting is to court their ruin. The dust will cut into them. In removing a tire from the rim and putting back again the paint upon the rim is certain to suffer more or less injury. The places where the paint is thus removed, whether on the inner edge of the rim or on its outer edge, should not be allowed to remain bare but, as opportunity occurs, should be painted over with some air drying enamel, after the spots had previously been cleaned up with a little worn emery cloth. If the bare places are allowed to remain and the water gets into them in the wheel's passage through the mud, rust starts and eats its way into the canvas and rapidly rots away the fabric, with the result that the neglect of a little thing like rust spot in the end causes the payment of a big bill for it in the shape of a new tire.

Economy of Coasting.

Coasting should be indulged in whenever the nature of the country and the amount of traffic on the road will allow it to be done with safety. Not only does coasting tend to economy in fuel, but it allows the motor to rest, particularly if the latter has been working hard in climbing hills or running over heavy roads.

WHITTAKER CHAIN TREADS.

We herewith illustrate the Whittaker Tire Chain Grip showing the simple method of application. This is manufactured by the Whittaker Chain Tread Company of Boston, Mass. The chains are hard steel



Whittaker Chain Tread—Showing Mode of Application.

wire hand welded, and both the chain and hooks are copper plated. There can be no question about the danger and inconvenience caused by skidding and many contend that the only sure remedy comes by the use of tire chains. Interested readers are urged to write for full particulars and prices to the Whittaker Chain Tread Co., of Boston, Mass., not forgetting to mention the AUTOMOBILE DEALER AND REPAIRER.

REDUCTION IN TIRE EXPENSE.—Our readers should consult the new announcement in this issue of the Leather Tire Goods

Company of Niagara Falls, N. Y. They say you can reduce your tire expense by using Woodworth Treads. The advertisement will explain why. Cut out the coupon in the advertisement, and send it to them at once, and a catalogue giving full particulars will be forwarded promptly.

NEW CATALOGUES.—Two new catalogues of interest to motor truck and motor buggy manufacturers, dealers and owners were recently issued by the Diamond Rubber Company. The first one illustrates and describes in detail the Diamond Wire Mesh Base Tire for motor trucks and commercial motor vehicles of every description, also the Side Wire Type. Both of these types are manufactured in single and twin tires of high grade stock and differ only in the method of applying the tire. Particular attention is called to the simplicity of the Wire Mesh Base Type, which the manufacturers say cannot come off, but can be taken off and applied easily without the aid of machinery. The second catalogue referred to is devoted exclusively to Diamond Motor Buggy Special Tires. Almost as rapid as the growth of pneumatic tired automobiles has been that of the buggy using solid tires. The Diamond Rubber Company is now furnishing a complete line of solid tires for these vehicles. Either one or both of these catalogues will be sent to any reader who will write for them mentioning the AUTOMOBILE DEALER AND REPAIRER to the manufacturers, the Diamond Rubber Co., Akron, Ohio.

A REMARKABLE SOAP.—S. Strunz & Son, 708 Bingham St., Philadelphia, Pa., have

recently placed on the market a soap specially adapted for the washing of cars, or any kind of vehicle. They claim for this soap that it is impossible to injure varnished surfaces with it, no matter how unskillfully it may be used. We presume that further particulars may be obtained by writing the manufacturers of the above and mentioning the AUTOMOBILE DEALER AND REPAIRER.

THE SPITZLI AUTO JACKS.—We desire to call special attention to the attractive announcement in our advertising columns this month from the Spitzli Manufacturing Co. of Utica, N. Y. They manufacture the Spitzli Auto Jack, an extremely handy appliance for any motorist. This jack is a marvel of compactness, simplicity and effectiveness. It weighs but $5\frac{1}{2}$ pounds, but it lifts a 4000-pound car with the pressure of one foot on the handle. It is a great convenience to operate a jack with the foot as it prevents the necessity of getting down into the dust and dirt on the hands and knees. No one starting on a tour should be without one of these jacks. Read the advertisement carefully and when you send in inquiries please cut the coupon from the ad or else mention the AUTOMOBILE DEALER AND REPAIRER.

DYKE'S COURSE OF AUTO INSTRUCTIONS.—In this issue will be found the announcement of A. L. Dyke, 1406 Bank Commerce Building, St. Louis, Mo., in which he offers to give instructions in running the automobile. But consult the advertisement, and in corresponding with him, mention the AUTOMOBILE DEALER AND REPAIRER.



The Oil that Turns Minutes to Miles

Vacuum MOBILOIL relieves your automobile of wear and friction, and leaves it free to wrestle with the minutes and the miles. It makes perfect lubrication a scientific certainty, and saves paying for experiments and accidents, disguised as repairs.

VACUUM MOBILOIL

is made in six different grades for various kinds of automobiles. One of these grades is the *one oil*, the label of which guarantees it to be exactly suited to the requirements of your car.

Do not experiment. Write for free booklet, listing every automobile made and showing grade of MOBILOIL necessary for its perfect lubrication. Also contains track records to date and other facts of vital interest to motorists.

MOBILOIL, in barrels, and in cans with patent pouring spout, is sold by dealers everywhere. Manufactured by

VACUUM OIL CO., Rochester, N. Y.

Horsepower and Speed.

Don't for an instant think that your car will carry more weight or passengers than the manufacturers claim for it. Better underload than overload. And if there is no place for a rumble seat or for any seat whatever on the rear of the car, better not try to make one. More cars are spoiled by overloading or overspeeding than you imagine. In estimating the horsepower rating of automobiles, and comparing it—as you are likely to do—with the power of the real horse, you must remember that speed has a good deal to do with the amount of power consumed. You can, for instance, drive a ten-horsepower car 10 miles an hour without taking more than a quarter of the power than you would consume in going 50 miles an hour.

Hot Bearings.

For motors relying upon the splash system to lubricate the bearing on the crank shafts a small cock is placed in the bottom of the crank case arranged so the top of the cock will be on the level with the proper amount of oil in the case. By turning the cock on full and then pouring oil in the feed pipe to the crank case the oil should overflow through this cock when it has attained the proper level in the crank case.

Many cases of ruined bearings have occurred through this simple little overflow cock as the oil will fill the part of the cock above the shut-off and when the cock is turned on this oil will run out. On seeing the oil run the cock has been shut off quickly with the result that the crank case may have been empty.

Do not be afraid to allow the oil to run until the oil above the shut-off has run out and you are sure there is oil above the level of the cock.

Gratified? We Are—And Grateful.

ORDERS for Diamond Repair Material and Automobile Sundries made us, even, "Sit up and take notice," and we take this opportunity to express our thanks to the trade.

"Find out all about the Diamond line," we advised early in the season.

The result of the trade's investigation has been a flood of orders.

Have you "found out?"

The Diamond Rubber Co.
AKRON, OHIO.

One Gallon of Rubberlife Saves You \$60 to \$90

You pay \$7.50 per gallon or \$4 per half gallon for **Rubberlife**. One gallon will increase the mileage of your tires at least 3000 miles, saving you in actual cash \$60 to \$90.

The most any manufacturer will guarantee for his tires is 3500 miles. Thus, under ordinary conditions you pay 6 cents a mile for tire service. **Rubberlife** doubles the life of your tires, reducing the cost per mile to a little over 3 cents, besides making your ride much easier.

Rubberlife is easily applied. You can do it yourself with little trouble. It softens and vitalizes the tires and we positively guarantee that **Rubberlife** will not injure any tire.

Let us send you our Booklet showing how **Rubberlife** Brings Tire Economy and Comfort.

If you are a dealer or garage manager, write for our special prices.

Rubberlife Selling Company
840 Real Estate Trust Building
Philadelphia, Pa.

This Coupon Saves You \$2.50

Send this coupon and \$5 for trial gallon of **Rubberlife** (Cost any other way, \$7.50).

Name

Address

(ADR Oct. 09)

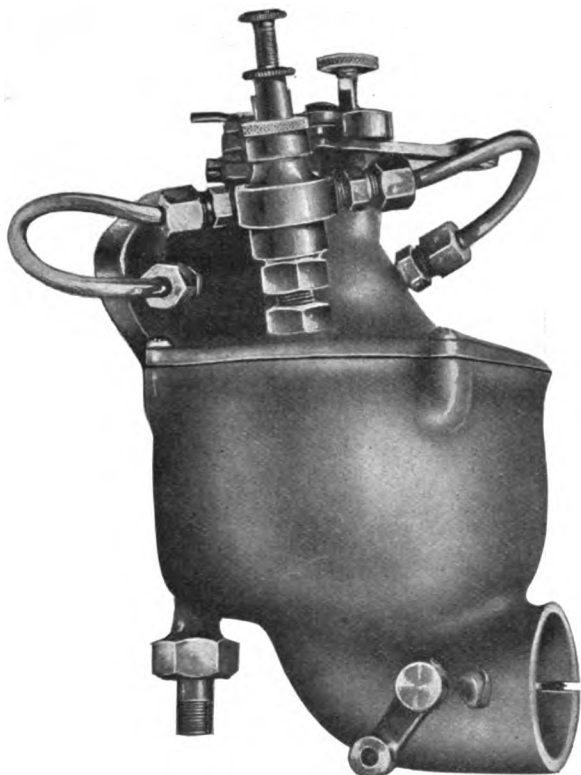
Fill in and mail to Rubberlife Selling Company, 840 Real Estate Trust Building, Philadelphia, Pa.

THE G-L ECONOMIZER.

This device is an air-controller; and automatically governs the air in the float chamber of any float feed carburetor. It is the only device of its kind in the world, and is fully protected by American and European patents. While this invention may be applied to any float feed carburetor, as already stated, it is shown in the illustration attached to a "Buffalo" carburetor. It is claimed by the manufacturers that this

obligation to keep the "Economizer" unless it is satisfactory and it is a simple matter to cut out the coupon and send it in. In all correspondence, please mention the AUTOMOBILE DEALER AND REPAIRER.

WHAT IS RUBBERLIFE?—Consult the announcement of the Rubberlife Selling Company, 840 Real Estate Trust Building, Philadelphia, Pa., in this issue, and you will learn something about it. Perhaps enough to make you want to know more, and if so,



The G-L Economizer. As Applied to a "Buffalo" Carburetor.

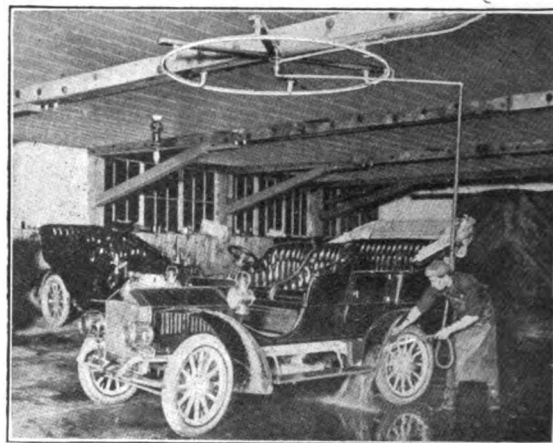
"Economizer" will effect a saving of as much as 50 per cent. in gasoline, to say nothing of securing uniformity with each and every charge, and in addition increasing the power from 10 to 20 per cent. and preventing overheating of the engine. The method of operation is as follows: The attachment is connected to the suction tube in which the vacuum is created by the engine. The atmospheric pressure existing in the float chamber of the carburetor is converted into a partial vacuum. This vacuum increases and decreases in proportion to the increase or decrease in the suction tube and governs the quantity of gasoline issuing at the spray jet, thereby absolutely insuring a uniform mixture being delivered to the engine, irrespective of load or speed. It is attractively designed, fully guaranteed, and is supplied with all necessary fittings and tubing for making a workmanlike job, and is very simple to attach to any standard float feed carburetor. The price of the "Economizer" complete is \$10, but the manufacturers are so confident that it will satisfy that they offer to send the device C. O. D. to any address, and they further offer to allow 30 days' trial and if the user is not completely satisfied he may return the "Economizer" and receive his money back. To receive the benefit of this offer it will be necessary for the reader to cut out the coupon which appears this month in the announcement of the G-L Economizer Company on our back cover page, and we hope many of our readers will take advantage of this opportunity to effect a saving in the operation of their automobiles. Remember there is no

this company will send their booklet showing how you can save money by using Rubberlife. Mention the AUTOMOBILE DEALER AND REPAIRER. They say that one gallon of this preparation will increase the mileage of a tire 3000 miles, thereby as they claim saving in cash from \$60 to \$90. If this preparation will pretty nearly double the life of a tire, every one of our readers will be interested in it.

Subscribe to the "Automobile Dealer and Repairer," \$1.00 Per Year.

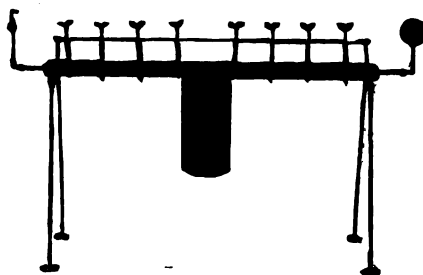
THE PERFECT OVERHEAD VEHICLE WASHER.

The accompanying illustration will give our readers a definite idea of the benefit derived from the use of a good overhead washer, which should be considered a necessity in any well appointed garage. The machine shown in the cut is the Perfect Vehicle Washer, manufactured by the Perfect Manufacturing Co., Saratoga Springs, N. Y. This machine is both simple and durable. A track seven feet in diameter is attached to the ceiling of the garage and upon this track a pivoted water pipe revolves, so that the operator can readily get at any part of the motor car with a hose, which is attached to the overhead fixtures. By means of this device it is possible to keep an automobile perfectly clean with very



The "Perfect" Overhead Vehicle Washer in Use.

little expense or trouble. It is claimed that the Perfect Washer is a time-saver, a water-saver, a money-saver and a temper-saver. These washers are manufactured in five different styles and it will pay all our readers to send to the manufacturers for their free illustrated catalogue, which describes the various machines in detail. They are so confident that their machines will satisfy you, that they make to the readers of the AUTOMOBILE DEALER AND REPAIRER a remarkable special offer. They will send one of their machines on free trial for 20 days, and if it is not satisfactory, the washer may be returned at no expense, except cost of shipment, to the user. As this free offer may only be a temporary one, we urge our readers to correspond quickly with the Perfect Manufacturing Company, 189 Circular St., Saratoga Springs, N. Y., not forgetting to mention this magazine.

MILLER'S INNER TUBE VULCANIZER.

Has a tube plate 54 in. long and 4 in. wide with plain surface highly polished, complete with stand, 12 fine boiler, gas or gasoline burner, water glass, pop valve, steam gauge, 8 clamps and two molds for curing the treads of casings, price \$30.00. Tube plate only with steam gauge and 6 clamps, price \$10.00.

We also manufacture various other vulcanizers. No. 1 and No. 2 adjustable sectional vulcanizers, complete with boiler, \$35.00 each. Bicycle vulcanizers, \$7.50; Motor cycle vulcanizers, \$12.50; Tread Rollers, \$12.00; Kettles, \$115.00; Power wrapping machines,

\$175.00 each. Also special round molds with flush joints for splicing inner tubes. We do all kinds of tire repairing and carry a large stock of tires at reasonable prices. If further interested in vulcanizers write for catalog and special proposition.

CHAS. E. MILLER, Anderson, Ind.

Please mention the Automobile Dealer and Repairer when writing to advertisers.

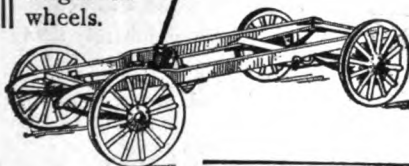
Empire Tires
WEAR LONGEST

EMPIRE TIRE CO.
TRENTON, N. J.

Branches and Agencies Everywhere

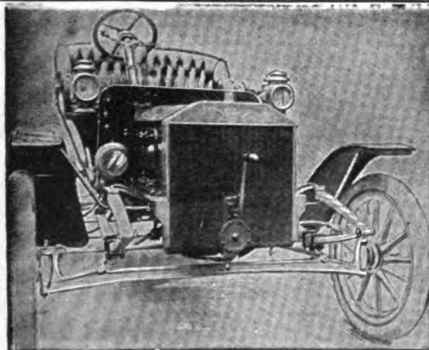
AUTOMOBILE

Running Gears, with pressed steel or angle iron frames, also chain or shaft drive. Any wheel base up to 138 inch, and any height of wheels. **ALSO ALL KINDS OF BODIES** Wheels, Axles, Steering Devices, Springs, Etc.



BORBEIN AUTO CO.,

2109 & 2111 N. 9th ST.,
ST. LOUIS, MO.



Shumard's Front Spring Outfit for Ford Cars.

Patents Pending.

The most decided improvement ever made on a finished car of standard manufacture.

The difference in the riding and operating qualities is noticeable at once, and the surprise is a delight.

The safety of the outfit over the single spring cannot be figured in dollars and cents.

The greatly improved appearance is striking and produces favorable comment. **HUNDREDS ALREADY SOLD.**

Brackets and perches are now made of Vanadium steel with a tensile strength of more than 140,000 lbs.

Springs are the finest quality, tempered in oil, and carefully tested.

Finished, painted and carefully packed in wood box.

Liberal discount to legitimate dealers. Write for further particulars and price to

THE SPECIAL MOTOR VEHICLE CO., Cincinnati, Ohio.

C. O. T. TIRE PATCHES



Mr. Dealer and Owner: Have you ever thought that to make a good repair you have got to have the correct article? You can get it in our Patches. They are made to absorb the cement, and have a heavy center and feather edge. Can be obtained from all jobbers.

C. O. TINGLEY & CO.,
RAHWAY, N. J.

DON'T START ON THAT TOUR WITHOUT IT

THE Spitzli
GUARANTEED
AUTO JACK

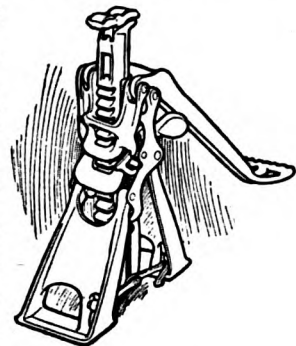
"THE BIGGEST LITTLE THING ON EARTH."
No. 12 Net Retail Price \$2.50

Listen: Here in a nutshell are a few of its best features:

In the first place it weighs only 5½ pounds—next to nothing.

BUT IT LIFTS A 4,000 POUND CAR with the pressure of one foot on the handle. Did you get that—about the foot?

IT WORKS WITH THE FOOT! What a blessing! No groveling in the dust or mud on the hands and knees. You put the Spitzli Jack under the car, slide the extension ladder up to the axle and then press down with the foot on the handle. With every full stroke the load is lifted one-half inch. Compound Safety Clutches hold it there as firm as a rock until the next stroke sets it higher.



And lowering the load is a cinch.

Just throw off the reverse controller with your toe, press down on handle with the foot just the same as in lifting, and down comes the car—steadily—inch by inch, without jerk or a jar, as gently as a mother lays her babe in the cradle.

Sounds easy, doesn't it?

Well, that's the way it works.

Then again—

The Spitzli Auto Jack doesn't take up any room to speak of in your tool box—only 10½ x 3½ x 3¼ inches. That's worth considering if you want to save space. It's the **smallest** Jack in the world for what it does.

But that isn't all—

There are a number of other remarkable and practical points about this big little Jack. They are told plainly and interestingly in a little booklet "I" which is just hot off the press.

Send us your name and we will be glad to mail it to you right away.

The net retail price of the No. 12 size is \$2.50. That's the price your dealer will ask you for it. If you can't get it from him send us a money order for \$2.85 (\$5c for express) and we will send it direct.

The Spitzli Jack is made in 5 sizes and every Jack is fully tested before leaving the factory. They are made of best quality of material and are **guaranteed** to work any time or your money back.

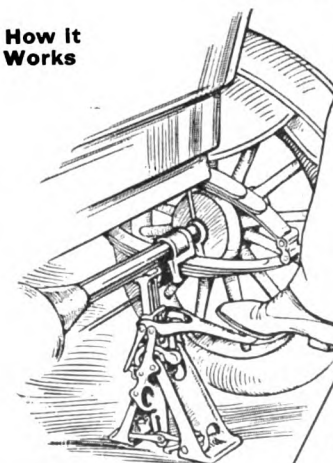
Don't start off on the Tour until you get a Spitzli Auto Jack and **get it now**—while the subject is fresh in your mind.

Anyway—send to-day for the booklet.

SPITZLI MFG. COMPANY

Utica, N. Y.

How It Works



SPITZLI MFG. CO.
Utica, N. Y.

Send Free Booklet "I" showing five sizes of the SPITZLI AUTO JACK and how it works.

Name

Street

Town

State

A. D. R.

Please mention the Automobile Dealer and Repairer when writing to advertisers.

WANT ADVERTISEMENTS.

Under this head will be printed advertisements of shops for sale or to rent, or shops wanted, or situations or help wanted, or tools or machines (second-hand) wanted or to exchange, at the uniform price of two cents a word, which will include the address, for each insertion, payable in advance. No advertisement will be inserted for less than 80 cents, however small.

Remittances can be made in postage stamps if more convenient. Address,
MOTOR VEHICLE PUBLISHING CO.,
24 MURRAY STREET, NEW YORK.

COMMERCIAL MOTOR VEHICLES—Read the "Power Wagon" for reliable information concerning motor trucks, motor buses, motor cars and other machines employed for business purposes. Issued monthly; single copies, 10 cents; \$1 a year. The most valuable paper of its kind published. The Power Wagon, Metropolitan Block, Chicago.

TOPS—Until further notice, runabout tops \$20, touring car tops \$35. C. G. Meyer & Son, Lima, Ohio.

FOR SALE—Running gear with tires \$75.00; steering wheel \$10.00; sliding gear, transmission, new, \$50.00; pressed steel frame \$25.00; set of fine lamps and generator \$15.00; top and seat for runabout \$35.00; 10 H. P. engine \$35.00; four horse stationary engine \$50.00. Lathes and machinery. Central Supply Co., Richland, Pa.

AUTOMOBILE—CORBIN AIR-COOLED, full equipment, top, speedometer, Gabriel horn, trunk rack, etc.; looks like new. Address, Box 707, New Britain, Conn.

"STEAM, Steam, Steam, That's The Stuff"—All Steam Car Owners should subscribe for the "Steam Motor Journal" a 28 page illustrated monthly devoted exclusively to the interests of the steam propelled automobile. \$1.00 per year, sample copy 15 cents. Chas. D. Sherman, 212 Orchard Road, New Haven, Conn.

FOR SALE—Automobile engine, 4 cylinder, air-cooled, Model G Knox. Apply to L. Schreiber & Sons Co., Cincinnati, Ohio.

ONE 1907 REO TOURING CAR—Top and detachable tonneau, solid tires, all in good shape; quick buyer's price, \$425. F. Herbst, Wilmington, N. C.

FOR SALE—Automobile buggy, 8 horse power, water cooled, single cylinder, in good running order, \$75.00. Address, O. A. Bierly, Bloomington, Ind.

Build Your Own Cars.

We can furnish you with chassis parts, including engine, axles, transmission, frame, etc., at attractive prices. Write us for details.

John H. Blacker & Co.,
Chillicothe, Ohio.

FOR SALE—Two thirty by three and one-half Swineheart tires and rims in good shape. Price \$25.00 for the pair. Address Eldredge-Beebe Automobile Co., Marshalltown, Iowa.

A BARGAIN—Rebuilt 7 horse power runabout, \$150 if sold immediately. Box L, Wolf Creek, W. Va.

FOR SALE—We will sell one half interest of automobile accessory or will sell entire. Haven't capital to push properly. Address "Rare Chance," care of the Automobile Dealer and Repairer, P. O. Box 654, New York City.

WANTED—A White Steamer. Will trade my strictly first-class Mitchell. Write full particulars to Maytor Hoppenyan, Ashland, Wis.

WANTED—Agents to sell our "Innershush" and "Shur-hold Patches" in every locality. Write for particulars. Address Inner Shoe Tire Co. Grand Rapids, Mich.

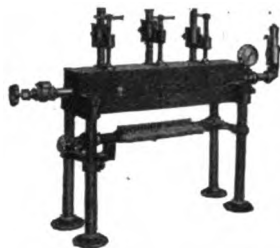
FOR SALE OR EXCHANGE—For Thor motor cycle runabout, 16 horse power, double opposed motor, new motor. Address, O. R. McCormick, Bancroft, Wis.

FOR SALE—A first-class general repair shop. Address for full particulars, J. W. Peffley, 1007 West Willis avenue, Perry, Iowa.

AUTO 1909 CASES AND TUBES, new, fresh from the factories.

Size	Case	Tube	Size	Case	Tube
28x2½	\$8.50	\$2.75	32x3½	\$18.00	\$4.25
28x3	11.55	3.10	32x4	23.10	4.95
28x3½	16.40	3.85	34x3½	19.25	4.50
30x3	12.00	3.30	34x4	24.85	5.30
30x3½	17.05	3.95	34x4½	30.80	7.40
30x4	21.80	4.40	34x5	42.25	8.50
31x4	23.25	4.40	31x4 fits 30x3½		rims.

Also a few guaranteed cases 30x3 \$14.10. 30x3½, \$20.75; 32x3½, \$22.05. Single tube tires 28x2½, \$10; 28x3, \$12. Seconds \$2 less. I ship, pay for tires after examination. Prices subject to change without notice. Wm. Vanderpool, Springfield, O.

**The "Boilerless" Steam Vulcanizer**

Underneath the square semi-steel body is fitted our special gas burner, thus doing entirely away with boiler for inner tube work.

Gasoline burner and tank supplied instead of gas if desired.

Furnished complete with steam gauge, safety valve, filling valve, air cock, and our well-known quick acting clamps. **LOW COST. HIGH SATISFACTION.** Immediate shipment. Write us to-day.

WISHART-BURGE MACHINE WORKS,

64-66 SOUTH CANAL STREET, CHICAGO, ILL.

GEISZLER NON-SULPHATING STORAGE BATTERIES.

An important full-page announcement is published in this issue by Geiszler Bros. Storage Battery Co. of New York. The



The Geiszler Midget Non-Sulphating Storage Battery.

price of their size 66 storage battery (6 volts, 60 ampere hours) is now \$20 and at this price they are perfectly willing to have comparisons made. These batteries

are put out with an ironclad guarantee; and it is generally acknowledged that price for price and quality considered these batteries have no superior. The non-sulphating features of all Geiszler storage batteries insure long life and high efficiency, enable them to retain their charge for months without loss and make it possible to leave them standing for months either charged or discharged, without the slightest injurious effects, as they are absolutely non-sulphating under any conditions. The same manufacturers also put out the "Midget" Storage Batteries illustrated herewith. These are specially designed to take the place of the ordinary No. 6 dry batteries but on account of the dependable non-sulphating qualities of the Midget storage batteries ignition troubles common with dry cells are overcome.

The size of the Midget, being the same as the No. 6 dry battery, they will fit any dry battery box, but as each Midget gives two volts, two Midgets will replace 3 or 4 dry cells and 3 Midgets will replace 5 or 6 dry cells. A Midget reserve battery can be depended upon to bring you safely home in case of trouble with your regular source of electric current, as they will retain their charge for months when not in use, and they can be used while the magneto is being repaired or your storage battery is being recharged.

For prices and full particulars concerning the Geiszler Batteries address Geiszler Storage Battery Co., 1520 West 57th Street, New York City. Inquirers are requested to mention this magazine.

"MORSE" AUTOMOBILE SPECIALTIES.

We wish to call the special attention of our readers to the very useful line of automobile supplies manufactured by Frank W. Morse, 516 Atlantic Avenue, Boston, Mass. This line includes garage trouble, inspection and search lamps, sparking plug and bat-



Garage Inspection Lamp. Manufactured by Frank W. Morse, Boston, Mass.

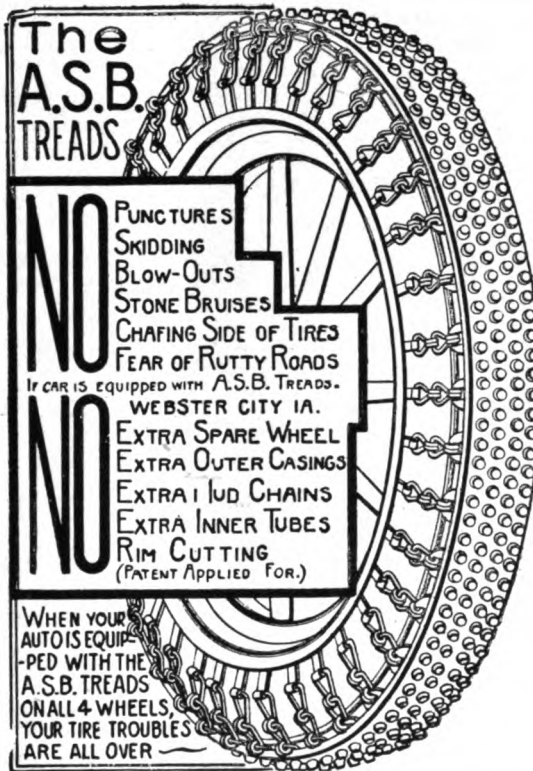
tery terminals, binding posts, etc. We illustrate Mr. Morse's garage lamp, style No. 26, which is extremely useful in working under or around a motor car. For further particulars consult the advertisement on our inside front cover and write for price list to Frank W. Morse, 516 Atlantic Avenue, Boston, Mass. To be sure of prompt attention, please mention this magazine.

Please mention the Automobile Dealer and Repairer when writing to advertisers.

The Only Tire Protector

that will not heat the tire and burn the inner tube or creep on the tire, which saves power and wear.

The only Air Cooling Tire Protector on the market.
The side steel No. 8 gauge wires are conductors of heat and draw it from the tire and the turning of the wheel in the air cools them.



SPECIAL OFFER
The first person in a town ordering a full set of four A. S. B. Treads will receive our Grand Prize Discount. We want one set in every town and city in the U. S. for advertising purposes. Write "KNOW."
Our Guarantee: If not satisfied, return them within 10 days, charges prepaid, and we will refund your money. References: Any bank in our city.

Our A. S. B. Treads are the very best Mud Chain and Rut Breaker made.
Write to-day for our Special Discount, for it's the first one only in a town that gets it.

QUEEN MFG. CO.
Lock Box, 204 Webster City, Iowa.

Let SHALER Help You Put the Money in the Cash Drawer

THIS SHALER

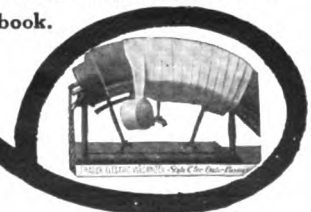
ELECTRIC VULCANIZER

Is the very best investment you could make for your Garage, primarily because it is a rapid money-maker, and will more than pay for itself in one week.

This statement is backed up by the fact over **three-fourths** of the garages in the United States are making a **SHALER ELECTRIC VULCANIZER** bring in a large part of their revenue.

It heats in a very few minutes, consuming less than one cent's worth of current per hour. The heat is automatically regulated so that there is no danger of overheating, although it does not have to be watched, and while one tire is being vulcanized, another can be prepared.

Auto Owners, write for Tire Handbook.



Write for Full Description

C. A. SHALER CO., Mfrs.

Box X

Waupun, Wis., U. S. A.

"Knipe" Pat. Ball Bearings. Steel Brass Balls.

1/4 Inch Shaft and Up.
No Fitting. Just Push Them On.
10 Cents in Stamps for Sample.

PRESSED STEEL MFG. CO.,
454 The Bourse, Phila., Pa.

BRENNAN MOTORS.—In this issue the Brennan Motor Mfg. Company of Syracuse, N. Y., have a new announcement. Our readers, who are interested should send for catalogue and further particulars concerning this motor. The guarantees connected with it indicate that its manufacturers have great confidence in it.

DID YOU EVER USE GRAPHITE?—If you have not write to the Joseph Dixon Company, Department 184G, Jersey City, N. J., for particulars concerning Flake Graphite for lubricating purposes.

AUTOMOBILE SPRINGS All Styles.



Made or duplicated by
TUTHILL SPRING CO.
758 Polk Street, CHICAGO, ILL.

THE CLIMAX AIR COOLED MOTORS

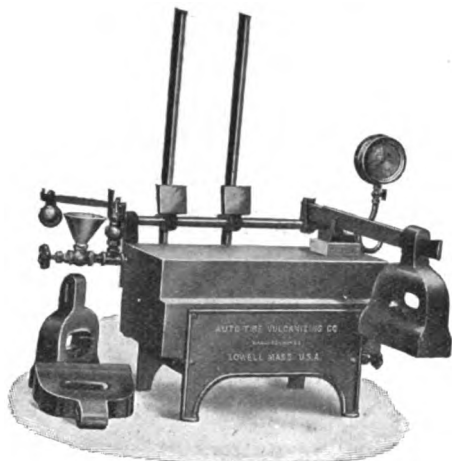
are the best automobile motors out. Guaranteed forever against defective material and workmanship. Let us tell you all about them. Write at once for Catalogue.

CLIMAX ELECTRIC WORKS, New Salem, Mass.

Subscribe to the "Automobile Dealer and Repairer," \$1.00 Per Year.

Please mention the Automobile Dealer and Repairer when writing to advertisers.

AUTO TIRE REPAIR OUTFITS



No. 2 VULCANIZER
Weight 275 lbs.

This Vulcanizer is manufactured especially for repairing the inner tubing of double tires. With it incisions or breaks up to the extent of 20 inches in length can be perfectly repaired.

By its use in connection with the No. 1 Vulcanizer every repair needed on tires can be completed in the most satisfactory manner.

Write for printed matter of other devices used in repairing and retreading tires.

SEND FOR FULL INFORMATION.

Auto-Tire Vulcanizing Co.,
MANUFACTURERS,
LOWELL, MASS., U. S. A.



Your
Stenographer
will do
More Work
Every Day with the

UNDERWOOD

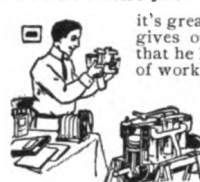
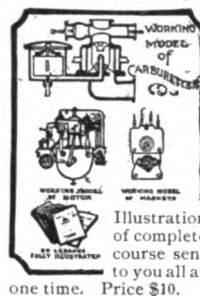
STANDARD
TYPEWRITER

Because—Visible writing as originated in the Underwood, entirely eliminates the wasted time and energy spent in lifting the carriage of a "blind" machine. It allows the operator to keep the mind continually on the work—consequently there are fewer errors, greater accuracy and neater work.

Let us show you a few of the exclusive features and demonstrate to your entire satisfaction, the immeasurable superiority of

"The Machine You Will Eventually Buy"

THE UNDERWOOD TYPEWRITER CO., Inc. Anywhere



Master the Automobile with DYKE'S COURSE OF AUTO INSTRUCT ON. A course for EVERYBODY, no matter who you are—study during spare time and turn it into profit. LISTEN!! The secret is in our *Working Models* which *actually* work, and our simple Lessons with large charts can be understood by a boy, the models picture the meaning. *Some of the most prominent people in the country are taking our course and we have received a testimonial letter from every customer. The course will be sent on two days' inspection, on receipt of price (privilege of returning if not satisfactory).* A. L. Dyke, who compiled this course, was the first Auto Supply man in America and wrote the first book on autos. Mr. Dyke collected matter for this course in Europe. An *Auto Owner* writes that he saved the cost of the course the first week. Dr. H. J. Allen of Corinth, N. Y., took our course before buying a car and it enabled him to make a careful selection, and you should just read his letter—*A Student is now actually running a repair shop and enjoys the course. Terms: \$5 cash, balance in 30 days.* Just imagine having in your study an engine cut in half and lettered and numbered, and a carburettor and magneto on your table while you study our simple lessons. That's practically what we give you in our working models—they work.
A. L. Dyke, 1800 Bank Commerce Bldg., St. Louis, Mo.

Don't Worry Over Tire Cost

Protect Your
Shoes and
Purse with
DAVIS ARMOR

Write for Art Booklet

Davis Robe Co.
1306 Champlain Bldg.
Chicago, Ill.



JUST OUT!

WRITE for our new 24-page booklet, "USE AND CARE OF MAILING LISTS." If you are at a loss to plan your Fall advertising campaign, or if you are hesitating between magazine and direct advertising, this booklet will put you on the right track.

If you are at present using **Mailing Lists**, we may be able to give you some new ideas as to the expeditious and economical handling of them. The book is full of useful suggestions for the advertising manager. It also gives a synopsis of all the state registration laws.

We Make No Charge.

The book is free to the advertising manager. We only ask that you write us on your firm's stationery, as we have only a limited number of the books and we do not care to waste any copies.

Automobile Advertising Company,
422 State Life Bldg., Indianapolis, Ind.

We will be glad to instruct you as to the cost and how to install a card filing system, or to figure out the cost of a circularizing campaign.

Red Head

TRADE MARK



The SPARK PLUG that has the quality—that is popularly priced—that nets the trade the profit it is entitled to.


Devote your energy on the plug that will bring results.

All styles, all sizes, Porcelain or mica, \$1.00.

EMIL GROSSMAN COMPANY, Manufacturer
232 W. 58th Street, New York

Branches:
Chicago, 1436 Michigan Ave. Detroit, 874 Woodward Ave.

If you expect to win your customers' cable trade you should carry



in stock

High Efficiency Low List Prices

A Big Advertising Campaign

combined are creating a demand that will mean good profits for yourself.

Write for Samples and Prices

EMIL GROSSMAN COMPANY
232 West 58th Street NEW YORK

Branches: Chicago, 1436 Michigan Ave.; Detroit, 874 Woodward Ave.



Friction Transmission Chain-in-Oil Driven.

The Cartercar is in a class of its own for simplicity. It has but few parts.

The annoying features of other cars are eliminated with the Cartercar patented Friction Transmission and patented Chain-in-Oil Drive.

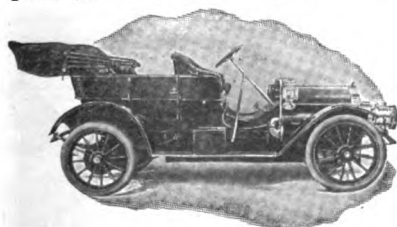
There is no clutch—no gears—no water pump—no fan—no universal joints—no shaft drive—no bevel gears—no

grease packings—no noise—and only one control lever.

The Cartercar will climb a 50% grade with five passengers.

A boy can drive and care for it as well as a man.

Write, if you are interested, to Pontiac, Mich.



\$1,350.

\$1,350.

The Wind Shield That Sells The Hydraulic



The woods are full of wind shields. But there's only one with hydraulic pumps and that's the shield 95% of your customers want. We're conducting a national advertising campaign and circularizing the 250,000

owners in America to educate them that The HYDRAULIC action guarantees safe and easy operation and freedom from rattling and glass bills.

It doesn't pay to handle mechanically inferior shields with THE HYDRAULIC at \$30.00 list and liberal trade discounts.

Write for our 1910 proposition.

Emil Grossman Company, Mfr.,
232 West 58th Street, New York

Branches:
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PACIFIC COAST, Pacific Sales Corp., 50 Van Ness Ave.,
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CANADIAN Distributors: Electrical Specialties, Ltd.,
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REDUCTION IN TIRE EXPENSE.



In spite of the fact that tires have gone up in price and are going still higher, you can reduce your tire bills to about one-half of what they have been and do away with tire trouble—punctures, skidding, etc.—by using WOODWORTH TREADS.

THE 1910 WOODWORTH IMPROVED SELF-ADJUSTING TREAD is more durable, neater in appearance and easier to apply than the older styles.

The new coil spring adjustment allows the cover to stretch enough for any make of tire and automatically holds the TREADS at just the right tension.

Anyone can quickly and easily fit them to any make of tire. They cannot be put on wrong.

The springs always hold them snug and smooth so they cannot injure the tire.

The leather of the new Tread is treated by a new process which keeps it soft and pliable so that it never cracks or breaks up between the rivets. This with an improved rivet makes them give about double the mileage of the older styles.

Prices:
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32x3½.....15.75 36x4½.....24.50

Other sizes in proportion.

We deliver them express prepaid where we have no agents.

Send coupon for circular and get posted on how to save money and feel safe from tire troubles.

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NIAGARA FALLS, N. Y.

Send me circular giving description and prices of the Improved Self-Adjusting Tread.

Name.....
Address.....

LEATHER TIRE GOODS CO.
Niagara Falls, N. Y.
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THE BUFFALO ELECTRIC VULCANIZER

Will enable you to REPAIR YOUR OWN TIRES.
THREE TIMES THE LIFE.

A NECESSITY FOR EVERY AUTO OWNER.

FREE

Send for our Booklet "TIRE TROUBLES," with description of Vulcanizer, to-day.

BUFFALO ELECTRIC VULCANIZER CO.,

322 ERIE CO. BANK BLDG.,

BUFFALO, N. Y.

"1001"

Remove that Grease and Dirt from the Body, Running Gear, Seats, Hands and Clothing.

Cuts Grease like gasoline, yet it is guaranteed harmless as water. Will remove the rust from the radiator, water jacket, and will save every garage 50% on washing and cleaning cost.

AND THE CAR WILL BE CLEAN.

Sample, 50 Cents, Postpaid.

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1307 WABASH AVE., CHICAGO, ILL.



**WE MAKE THEM
TO FIT ANY CAR**

IT'S GRAPHITE YOU NEED,

Dixon's Flake Graphite. This is the finest lubricating graphite the world produces and it forms the basis for motor lubricants you need—your car needs them.

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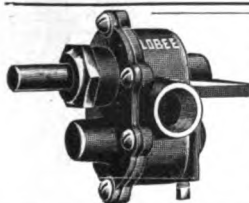
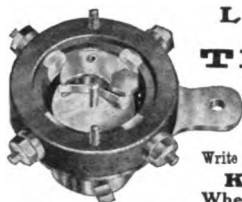
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We mean our superior goods
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"ERICKA" Hand Soap
It's a Fine Hand Soap
"ERICKA" Auto-Car Soap
Shineaul Metal Polish
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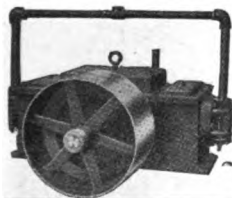
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LOBEE PUMP

LOBEE PUMP AND MACHINERY CO.
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Will Make That Repair Job SURE.
Are you getting our pretty Monthly Calendars?
THE PACKARD ELECTRIC CO., Warren, Ohio.



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Patented

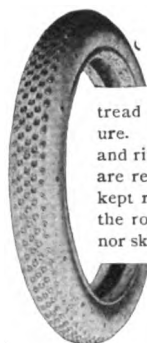
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Weight 200 lbs., a real machine, not a toy.

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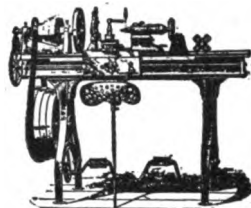
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Mechanicsburg, Pa.

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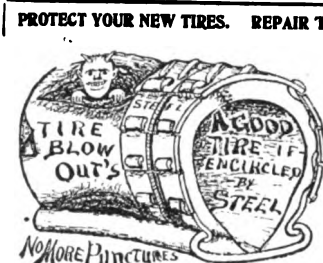
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Is made to wear indefinitely by replacing worn horse-shoe rivet heads which are renewable. The being thus protected will not puncture. We guarantee against blow-outs and cuts. **THE HORSE-SHOE TIRES** are resilient and when our rivet heads are renewed, are non-skid and safe on roads. A tire that will not puncture, and the mileage and wear is up to you. Send for Illustrated Booklet giving full particulars.



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Forever**

**Steel Link
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**Hooks to
Rim**

Enamelac Leather Finish in Five Colors.
Will restore the color and finish, or change the color of leathers and imitation leathers that have become worn, soiled and discolored. Is water-proof. Sufficient amount to refinish the leather in large car for \$1.00.



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OUTFITS
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GOOD GOODS. LOW PRICES.
LUBRICATING OIL TANKS ALSO.
\$3.50, \$5.25, \$6.50, \$10.00 and up.
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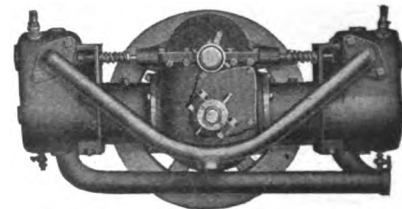
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The Beilfuss Double Opposed Motor

Makes a hit wherever used on account of its compactness.

Can be placed in any car from the small Olds Runabout to the larger sized cars.



Made in two sizes:
10-12 H. H. P. and 18-20 H. P.
Water Cooled.

Write to day for Circular and Prices.
Simplest and Strongest Motor Built.

Beilfuss Motor Co.
LANSING, MICH.

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and
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READRITE POCKET METERS

Noted for
**Accuracy, Durability
and Permanency.**

Written guarantee for one year
with each meter.

Ammeters, \$2.50
Volt-meters, \$3.00
Volt-ammeters, \$3.50 & \$4.00

Write for Circular and
Discount to Trade.

Read-Rite Meter Works
18 Main St., Clinton, O.

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THE DOW PERFECTED MAGNETO

For the Man Who Drives His Own Car and for the Chauffeur Who Is His Own Mechanic.

High Tension, Alternating Current of extremely high voltage. Jump spark. Arc flame, prolonging ignition. Greater fuel efficiency. More complete combustion. Increased power. Added speed.

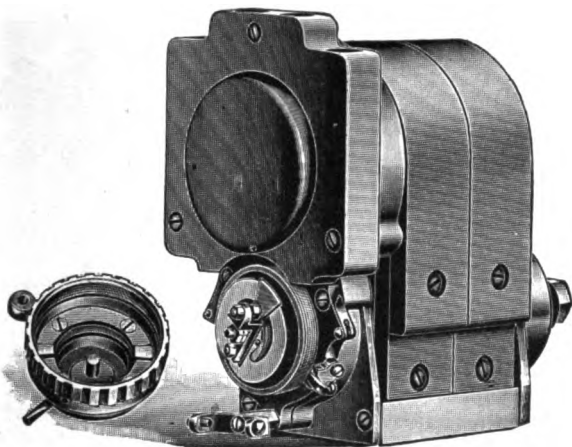
In Every Point the Dow Perfected Magneto is Superior to Any Other Magneto Made, Foreign or American. We Challenge Comparison and Comparative Tests of Every Kind.

No sooty cylinders. No fouled plugs. No sticky, pitted valves. The Dow Perfected Magneto Keeps the Motor Clean.

Sparks at a finger-turn. Quarter-turn of crank starts motor. Positively no skipping with Spark fully retarded. Car may be throttled down to four miles an hour.

Extraordinary Simplicity of Adjustment. Any adjustment necessary made without wrenches, screw-drivers or other tools. Everything mechanical and automatic.

The Dow Perfected Magneto represents not the best that was but the best that IS.



Interrupter Adjustment, Simple, Easy, Quick.

Require a Dow Perfected Magneto on every car you buy or sell. It will add class and quality to the \$500 or the \$10,000 outfit. The added vim and go to the motor will sell your complete line.

Any manufacturer will supply you with a Dow Perfected if you insist.

If you are overhauling cars, install the Dow Perfected Magneto. The Power of the engine will be doubled and the result of your work trebled by the perfection of ignition obtained.

Write for reasons why the Dow Perfected Magneto Overcomes all Ignition Troubles.

DOW MANUFACTURING CO., Braintree, Mass.

DON'T START ON THAT TOUR WITHOUT IT

THE Spitzli GUARANTEED AUTO JACK

"THE BIGGEST LITTLE THING ON EARTH."
No. 12 Net Retail Price \$2.50

Listen: Here in a nutshell are a few of its best features:

In the first place it weighs only 5½ pounds—next to nothing.

BUT IT LIFTS A 4,000 POUND CAR with the pressure of one foot on the handle. Did you get that—about the foot?

IT WORKS WITH THE FOOT! What a blessing! No groveling in the dust or mud on the hands and knees. You put the Spitzli Jack under the car, slide the extension ladder up to the axle and then press down with the foot on the handle. With every full stroke the load is lifted one-half inch. Compound Safety Clutches hold it there as firm as a rock until the next stroke sets it higher.

And lowering the load is a cinch.

Just throw off the reverse controller with your toe, press down on handle with the foot just the same as in lifting, and down comes the car—steadily—inch by inch, without jerk or a jar, as gently as a mother lays her babe in the cradle.

Sounds easy, doesn't it?

Well, that's the way it works.

Then again:—

The Spitzli Auto Jack doesn't take up any room to speak of in your tool box—only 10½ x 8½ x 8¼ inches. That's worth considering if you want to save space. It's the **smallest** Jack in the world for what it does.

But that isn't all—

There are a number of other remarkable and practical points about this big little Jack. They are told plainly and interestingly in a little booklet "I" which is just hot off the press.

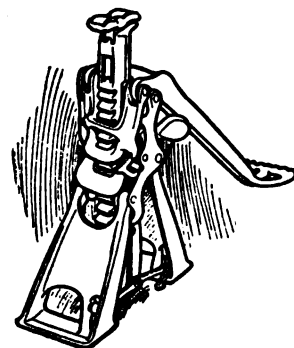
Send us your name and we will be glad to mail it to you right away.

The net retail price of the No. 12 size is \$2.50. That's the price your dealer will ask you for it. If you can't get it from him send us a money order for \$2.50 (85c for express) and we will send it direct.

The Spitzli Jack is made in 5 sizes and every Jack is fully tested before leaving the factory. They are made of best quality of material and are **guaranteed** to work any time or your money back.

Don't start off on the Tour until you get a Spitzli Auto Jack and get it now—while the subject is fresh in your mind.

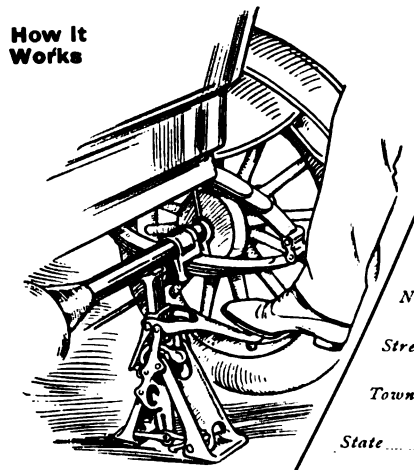
Anyway—send to-day for the booklet.



SPITZLI MFG. COMPANY

Utica, N. Y.

How It Works



SPITZLI MFG. CO.

Utica, N. Y.

Send Free Booklet "I" showing five sizes of the SPITZLI AUTO JACK and how it works.

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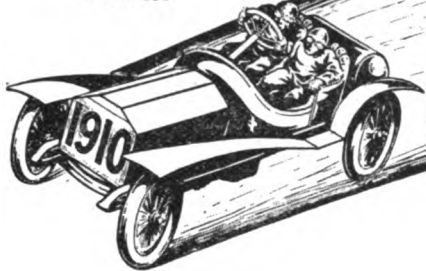
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Management of American Motor
Car Manufacturers' Association

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FORTY-THIRD STREET AND LEXINGTON AVENUE, NEW YORK

Admission, 50c.; Tuesday, \$1.00

FINEST DECORATIONS BY
UNITT & WICKES EVER
OFFERED AT ANY MOTOR
CAR EXHIBITION



You need not be afraid of the Devil

If you carry an M. & M. QUICK REPAIR OUTFIT in your tool kit. Repairs made anywhere, any time, any place. It's instantaneous, positive and self-vulcanizing. It's reliable too, and you need not be an expert to use it. Just follow directions and you will be surprised how easy repairs can be made.

With each outfit you can make about \$20.00 worth of repairs. Start now by curtailing expenses and repair your own punctures.

Outfit consists of ¼ pint Cement, ¼ pint Acid & Cement Brush, 1 Acid Brush, Emery Cloth, complete directions, etc. Complete, \$1.00.

At all dealers and jobbers, or, sent prepaid on receipt of price.



Manufactured by **THE M. & M. MFG. CO., Akron, Ohio.**

"Akron" Repair Kit

Makes the repair permanent, as it produces the same effect as vulcanization. The acid cures the cement to the rubber or part to be repaired, which makes it one solid piece of rubber and impossible to separate.



"Akron" Repair Kit
Price, Delivered, \$1.00

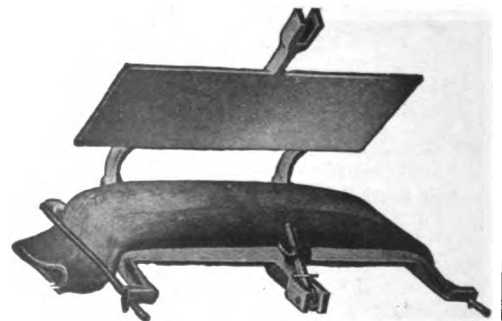
This Pure Aluminum Vise is intended to be used in applying patches to inner tubes. It holds the patches firmly in place while the rubber cement is setting and vulcanizing.

It prevents the patch edges from curling and positively assures you of a permanent repair to your inner tube. For use with any size inner tube. Small, light and strong. An absolute necessity for every automobile owner.

We also make the

"Akron" Inside Repair Patch,
"Akron" Tire Boot,
Motor Cycle Boots and Patches,
Top Dressing for Autos.

Ask your dealer, or write direct. We make regular inner tube patches, six sizes.

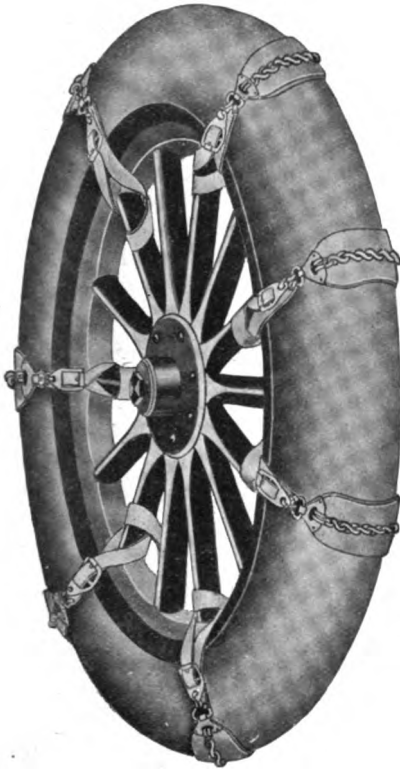


"Hold Tight" Aluminum Vise
For Inner Tube Patching,
Price, Delivered, \$1.25

THE EMPIRE MANUFACTURING COMPANY, 20 Beech St., Akron, Ohio

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WOODWORTH TIRE CHAINS: CANNOT WEAR OR INJURE THE TIRE.



The Cross Chains have heavy leather strips under them which protect the tire from any cutting or wear.

The WOODWORTH SINGLE TIRE CHAINS are held on the tire by a strap at each end that passes around the spoke and has the end fastened with a snap which snaps into the eye of an adjusting buckle.

They can be applied in a moment, even when stuck in the mud.

They cannot injure the point of the spokes or rim.

They cost less than other chains.

They are noiseless.

They are the only single chains that positively cannot injure the tire.

They can be used on studded tires.

PRICES.

8 inch,	50c. Each.	\$6.00 Per Dozen.
8½ "	60c. "	7.20 " "
4 "	65c. "	7.80 " "
4½ "	70c. "	8.40 " "
5 "	75c. "	9.00 " "

When one dozen is ordered they will be packed in a canvas bag without extra charge. Shipped prepaid to any part of the country on receipt of price.

Woodworth Tire Chains are also made in the familiar side chain style having an automatic strap adjustment that always holds them tight on the tires. Prices about the same as common chains.

Send for circular giving full information and prices.

Agents wanted everywhere.



LEATHER TIRE GOODS CO., Makers, Niagara Falls, N. Y.

Repair Materials That Do the Business

Repair men who are wise know that they can get better results with Goodyear Repair Materials than any others made. When you once make a repair with Goodyear material for a customer you have made a friend out of that customer.

He will be so pleased at the way the repair looks, the way it holds up, the way it saves his tire for him, that he will always come a long distance to reach your shop when he needs more work.

He will say to his friends: "See the good job I had done at So-and-So's repair shop. That's where you want to go if you ever need any repairs. Because So-and-So uses Goodyear Repair Materials and I know they're right."

And the reason Goodyear Repair Materials are always bound to be right is because only the highest grade of stock goes into them—instead of odds-and-ends and reclaimed stock.

Only the finest of pure Para Rubber and the strongest Sea Island fabric are used in Goodyear Repair Materials, just the same as Goodyear Tires.

If you have never used Goodyear Repair Materials, send for a book of sample sections. Just look, for instance, at our G-50 retreading stock, at a medium price.

This G-50 is about the most popular thing we have. Repair men are strong for it, saying it gives fine satisfac-

tion. It makes a particularly smooth and good looking repair, and wears great, too. It makes the kind of repair that a repair man can get a good price for, and is justified in doing it.

Our G-90 is a striking proposition. Note that this stock has one surface of cured rubber and the other of raw gum.

This can't be beaten for use inside an inner tube, where a large split or blowout has occurred. The cured black surface unfailingly keeps the stock from sticking to the other side of the tube when the cure is being made.

Our H. F. 31 Heavy Frictioned Fabric is equalled in no other line of repair materials, either as to quality of the fabric—best Sea Island—or the frictioned surface. It is giving excellent satisfaction nearly everywhere already.

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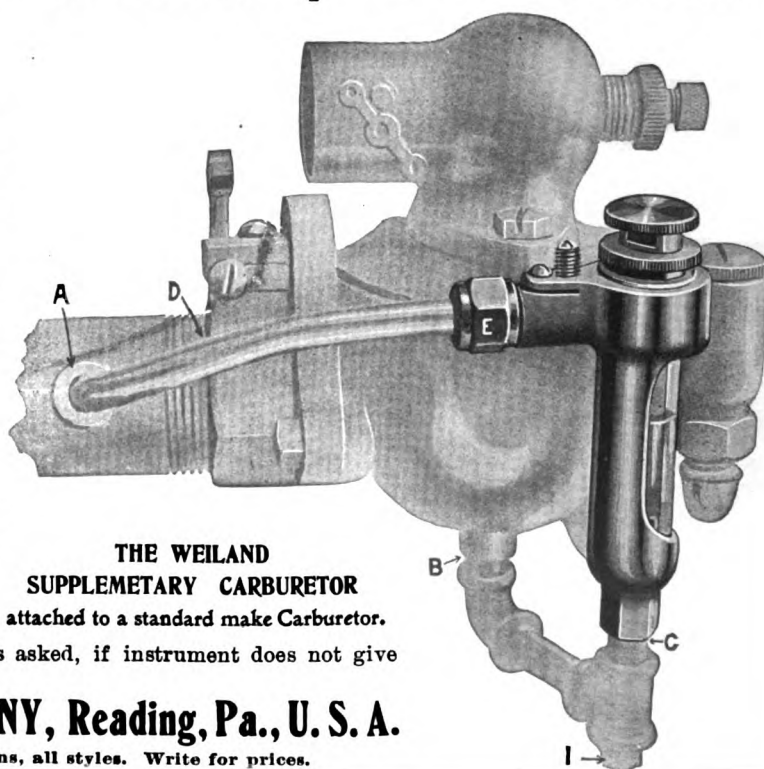
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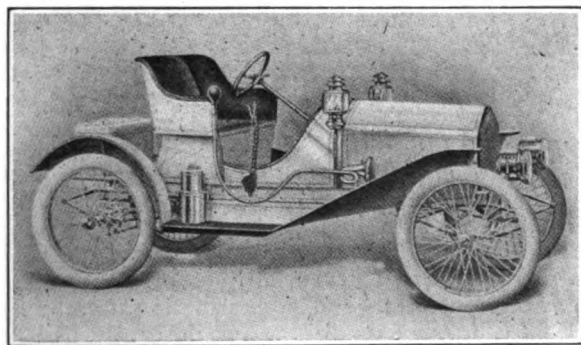
NEW METHOD OF SELLING.

Full Details of the Metz Plan of Sending a Car in Parts to Purchasers.

Under ordinary circumstances it is not advisable for any one to purchase the parts of a car from different manufacturers and assemble them himself. Not only will such assembling be found difficult—and of course in some cases impossible—but even after it has been accomplished the result is not satisfactory. There is a homogeneity about a good automobile that cannot be secured by purchasing parts of different makers.

But the Metz Automobile Company of Waltham, Mass., has adopted a plan of having the purchaser put the small parts together, while the wheels, motor, transmission, etc., are assembled before they are shipped. Moreover, all these parts are made at the Metz plant, and accompanying them is a detailed explanation of what the part is, and illustrated directions showing you how to assemble the part in the machine. Thus if you can read the instructions which accompany the parts, and have common sense enough to follow them, you cannot fail to put the car together successfully. No mechanical skill is required except the use of a wrench, screw-driver and such tools, common to almost every household. These are the only tools you will need, and the Metz plan supplies them.

One advantage in this plan is the fact that, in putting the machine together yourself, you are learning to know your own car and this is important, for if you understand your car and its mechanism, you can run

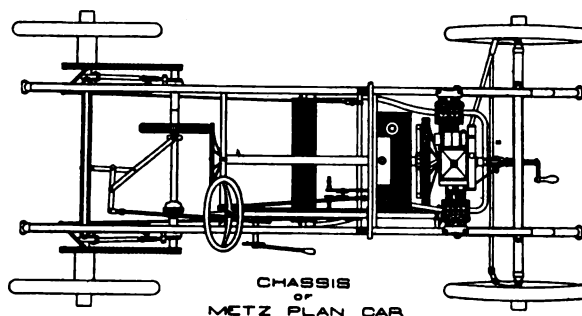


The Metz Car.

it in an intelligent manner and save it from many unnecessary repairs. Such repairs will surely be needed if you do not run your car in an understanding way. You cannot get pleasure out of an automobile if you have the constant worry, while riding, that something is liable to happen which you don't know how to fix.

Among the reasons given for adopting this selling system, the Metz Company calls attention to the fact that the cost of the best material and the cost of a machine when ready for assembling is but a small part of the total expense of building and marketing automobiles. The overhead and selling expense of a large plant are heavy. The expense of factory buildings,

general up-keep and depreciation, power, heating, lighting, insurance, taxes and traveling salesmen, constitute another heavy item. The floor space necessary to accommodate the assembling of a large number of cars call for a factory almost twice as large as would be needed if this extra space could be eliminated. Again, to paint an automobile and do a first-class job, takes from fifteen to twenty days, owing to the fact that paint dries slowly. The work itself does not require much time but it calls for extraordinary floor space to accommodate all these cars during this pro-



cess of painting. By the explicit directions and materials furnished with the Metz plan, you paint your own car.

And finally, you do not need to pay the whole price at once, but may begin to obtain a Metz car if you have only money enough to buy the first group of parts, and you may secure subsequent parts as fast as you require them, or as slowly as you wish.

As to the construction of the Metz car, it is extremely light but substantial, and it is claimed it has 50 per cent. more power for every pound of weight than the ordinary so-called light runabout. The following are the full specifications of the Metz car:

Motor—12 H. P.; $3\frac{1}{2}$ -inch bore and $3\frac{1}{4}$ -inch stroke; two cylinders; opposed, offset; ball bearings to main shaft and connecting rod. Timing gears enclosed. Oil fed to each cylinder by gravity. Splash in motor base.

Carburetor.—Schebler automatic. Adjustable gasoline needle valve. Constant unvarying mixture.

Transmission.—Composition plate on to a fiber sliding ring—any speed forward and reverse. High gear 4 to 1. Final drive $\frac{3}{4}$ -inch roller chains to rear wheels. Compensating gear on jack shaft.

Frame.—Reaches, pressed steel section. Tubular cross members 29 inches wide, 94 inches long.

Axles.—Tubular. Ball bearings front and rear.

Wheels.—Quick removable at hub; wire tangent spokes; steel rims; 40 spokes. Option: artillery wheels \$10 extra per set.

Tires.—Goodyear clincher detachable, $2\frac{1}{2}$ x28 inches.

Ignition.—Bosch magneto—high tension, jump spark.

Steering.—Hand wheel; geared reduction, very firm; no backlash.

Brakes.—Multiple disc in rear hubs; friction disc on reverse.

Control.—Throttle adjusting lever on steering column; foot pedal disc release.

Suspension.—Full elliptic springs, front and rear.

Body.—Skeleton frame, metal panels; double bucket seat neatly upholstered in genuine leather.

Equipment.—Two oil lamps; tail lamps; French horn; tool box.

Wheel Base.—81 inches, tread 48 inches or standard, as desired.

Capacity.—Two to 40 miles per hour. Climb any grade.

Weight.—Complete, 550 pounds.

Finish.—French gray. All parts primed at factory.

The parts are sent in 14 different groups and the purchaser may take one group at a time, two, three, or more, as you desire, or you may have the complete outfit in one shipment. Most customers take them in three shipments. Groups 1 to 5, 6 to 10, 11 to 14. In this manner the work of assembling may be carried on to very good advantage, and the freight or express cost is no more than when all are shipped together. The motor, transmission, shaft, wheels, magneto, carburetor, and all parts are assembled as units at the factory. You simply put them in place as you would a wheel on your buggy or handle bar on your bicycle.

These groups of parts cannot be purchased except in regular rotation at the rate of \$27 for each group. The price of car complete and assembled is \$600.

It may be stated that the factory and plant are up-to-date and cover a floor space of nearly two acres. Mr. Metz has a first-class record as a designer and builder and the material and workmanship are guaranteed.

The foregoing are the facts. As to the success of the plan or the character of the car, we know nothing, but both have an appearance of substantial merit.

GASOLINE FUMES.

How One Man Claims He Was Seriously Poisoned By Them.

An Englishman who has charge of a garage and attends to the car repairing, writes as follows about an experience he has had which he calls poisoning by gasoline fumes:

Never, since I was a small boy, have I had a doctor in attendance on me; that is, till this accident took place, and had I not been of a thoroughly sound constitution generally, I'm afraid I should not be giving this information now.

The garage was a comparatively large one, capable of holding about eight or ten cars, besides extra bench room, etc.; it was provided with a high roof, and well ventilated. On this particular day I wished to tune up a special engine, and, the weather being cold, I closed the front doors, but one of the windows was open.

I had, perhaps, been in an hour when another engineer came to see me. He remarked on the strong mixture the engine had been using, and asked if he had not better open another window and the doors. "Certainly," I said, "if you smell it as strongly as that. I've been experimenting with the carburetor. I don't smell the fumes excessively." But the point is I am, as a rule, exceptionally keen in detecting the proximity of foul gases of any description.

However, I went on with my work, which consisted in coil adjustments; but after a time I said I smelt the offensive odor, which was too strong for my liking, and that I was not going to do any more. Of course, the hydro-carbon gaseous mixture is not visible to any

extent, and the engine had not been over-lubricated, so that, apparently, the exhaust was as pure as anyone could wish, or, rather, expect.

I then stopped the engine immediately. After only a minute or two's delay, I went over to shut the large doors preparatory to leaving by a small one. I did not get as far as the doors, however, before I suddenly felt "top heavy," reeled, and fell to the concrete floor with a thud. I lay there probably for about a minute unconscious; then I recovered sufficiently to call to my friend, who had not so far noticed my peculiar behavior, to fetch some water. It being the first time he had been in the garage, he was at a loss to know where to find water. Happily his eyes lighted on a pailful—which, by the way, proved to be anything but clean!—and this he hastily brought to me, and I dipped my hands in it and moistened my forehead.

After that I felt practically all right and got up at once. I saw, however, some spectators on the opposite side of the road staring in a bewildered fashion in my direction; they evidently did not know what to make of my antics. So I went over and closed the doors—and I remember nothing more till I came to again, laid on the floor, with my friend damping my head. Again I got up, but my legs did not feel weak or "give" at all; I was perfectly steady, only my head seemed to be weighted. In evidence of this, I might mention that this time I picked up the pail of water and carried it out to the back yard, where I sat on a box; but I fell off before my friend could get to me. Anyhow, the application of more water to my head brought me round again, and I at once asked my friend to run for help. By that time I had a disagreeable sensation in my head, and I felt altogether as if someone had been holding me under water for as long as I could possibly bear. Luckily, he had not far to go; meanwhile I removed my collar and tie.

Although I lay out in the open for nearly an hour, I remember little else than the arrival of the doctor, and afterwards the ambulance men with a stretcher; but during that time the attacks grew less and less frequent until they stopped altogether, and I was removed home.

There is one thing I remember, and that is my friend walking round and round the yard, in order to try and shake off a kind of drowsy feeling, he said, but his legs gave way under him, and he had to sit down. Afterwards he was very sick.

Now it did not affect me in that way at all; moreover, he had been in the garage but a very short time altogether, and had been out in the open, going for help, etc., for a considerable time before he felt any effects of the unpleasant vapor upon him.

Later in the day I was seen by another doctor, who afterwards took charge of my case. He found me in a practically normal condition, but naturally had many precautionary measures to advise, considering what I had gone through. In the evening I walked about 500 yards along the road and back.

Next day I was better still—I felt so, and the doctor said so, and he advised me if I felt able to go out and get as much fresh air as possible. I went a short walk up the road, and was able to eat a little lunch. In the evening I called on a friend, and after a while I did not feel quite so well, and decided not to go back but to stay the night there. Shortly after that I was requesting someone to send for the doctor. I seemed to know that suffocating feeling as it came over me, and half an hour or so later, with the doctor present, I lay on a couch before an open window gasping for breath—"breath hunger" I think it is called.

I remember asking the doctor to get some flannel

warmed and put at my feet—rather a peculiar idea. It turned out I could not feel the hot bottles at my feet, and I thought they were cold, and yet the doctor could hardly keep his hands on them. I then offered my hands to be rubbed, as I felt them getting in the same condition as my feet. I was quite conscious at this time, although I could see those around me but very indistinctly, and for some time, when I was at my worst, I could not distinguish their faces at all.

The doctor then thought it necessary to give an injection (strychnine, I believe) in my arm. By this time I seemed to be losing all the strength and vitality that were left in my system, and I felt quite reconciled to the fact that I was dying.

The doctor then procured a cylinder of oxygen, which proved of immense value to me, both during that night and the succeeding day and night, the only other stimulants I had during that time being brandy and milk, and fresh supplies of oxygen.

I lost all interest in affairs in general, my hearing became affected, and I absolutely lost all sense of taste, my tongue being something like a bit of rubber matting newly whitened. My head and heart were both very painful, while latterly I had excruciating internal pains; and on the top of all this there was the constant recurring spasms of breathlessness.

After two days I was able to be moved upstairs, but it was only then that I began to feel gradually more ill and weak; it was a different kind of weakness from that which I had already experienced, and I was very ill for another three days.

A change of air, with one or two mild recurring attacks, and I soon recovered.

PRIVATE GARAGES.

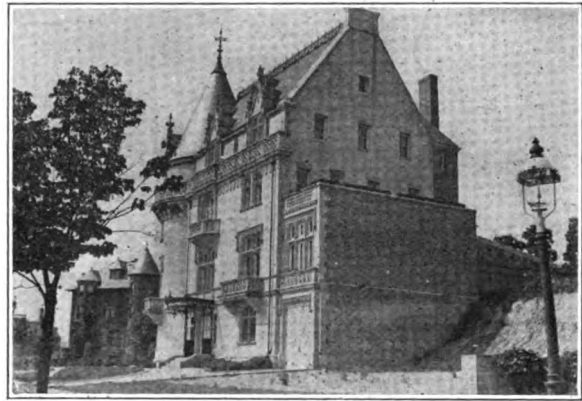
A New Phase of Architecture That Requires Both Taste and Adaptability.

With a large proportion of automobile owners a private garage is becoming well nigh indispensable. Time was, but a few years ago, when the privately owned shelter for a motor car was considered distinctly a luxury, but custom in this regard has undergone a marked change and motor car owners who can afford the expense of a garage are now prone to regard such a building as all but a necessity. One of the secrets of the change of opinion is found in the growing proof that private garages may be built at very moderate expense. In consequence the private garage is no longer restricted to persons who own residential property. In many instances occupants of rented houses have erected their own garages. With the cost of such buildings kept down to a minimum they figure that they will within a few years save enough money in the matter of automobile maintenance to reimburse them for the outlay for the garage. In addition to the monetary saving there is the satisfaction of having the car always within easy reach and the comforting knowledge that it is always where it should be when the owner is not making use of it.

Unlike many of the public garages which are manifestly and necessarily built for utility rather than for architectural appearance, the private garage offers the greatest opportunity for the exercise of artistic taste and ingenuity in the planning of buildings. Designed presumably for the accommodation of only one or two cars, or at most, half a dozen, the dimensions of the private garage are such as to allow considerations of exterior appearance to have an influence. Moreover, the fact that a private garage is almost invariably

located in close proximity to the residence of the owner makes it doubly desirable that the automobile shelter shall be, if not in the exact architectural style of the residence, at least in perfect harmony with the surroundings.

Many of the problems of the private garage are greatly simplified for the country resident or for the suburban dweller where spacious lots are the rule.



Private garage built as part of the mansion of the late Norwegian Minister at Washington, D. C.

With ample ground available for a site there may be erected almost any form of building that fancy dictates and the pocketbook permits. Similarly the cost of the garage may be kept down to a minimum by the erection of a frame structure if considerations of fire protection do not impel the use of some less inflammable material.

The city resident, on the other hand, finds himself hedged about by almost innumerable limitations when he sets out to provide a private garage. Particularly is this the case in the congested cities of the Atlantic seaboard. In the Middle West where the average urban resident has a lot at least forty, and more likely sixty, seventy-five or one hundred feet in width with



Plain but satisfactory private garage with brick walls, slate roof and concrete floor.

a depth of from one hundred to two hundred feet it is not much of a problem to find space on which to erect a small automobile house, but in the East where land is sold by the square foot, the situation is very different.

The expedient of providing space for a private garage on the ground or basement floor of the residence proper is used as a solution of the problem where land is at a prohibitive price. In not a few of our American cities, or at least in certain portions of these cities, conditions are so congested that it is almost impossible to obtain space for a private garage for love or money.

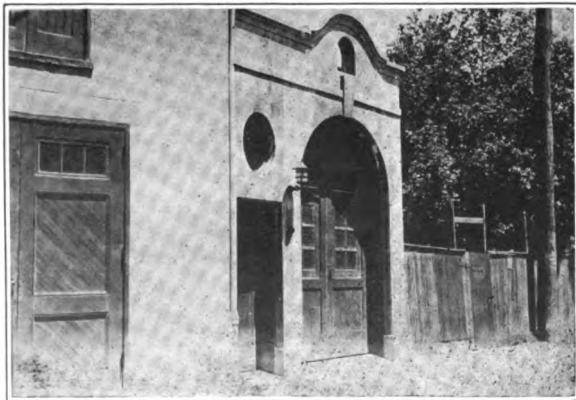
The plan of the basement garage has been adopted as an expediency in New York City and to a certain extent in other cities. It proves a boon to the man who wants to have his automobile under his own watchful eye at all times and yet cannot afford to invest in a garage site other than his residential holding.

Even when there is available plenty of land to allow



The new garage of Gen. Fitzhugh at Washington, D. C.

a separate structure some distance from the dwelling, the convenience of having an automobile at all times within arm's reach, so to speak, is impelling an increasing number of persons to construct a garage as a wing or an annex of a residence. This scheme of making a garage an integral part of the residential structure is ideal when the owner is his own driver, and is particularly appreciated when, as in the case of a physician, the motorist may be called upon to go forth in his machine at short notice and at almost any hour of the day or night. Similarly, what might be termed the self-contained garage is a great convenience to the woman motorist who is thus enabled, in bad weather, to step into her closed car without exposure to rain or snow and without danger of soiling her gown. While the annex garage is, of course, adapted to the storage of all classes of motor cars, it is perfection itself in the case of electric machines when there is



A modest concrete garage attached to a house.

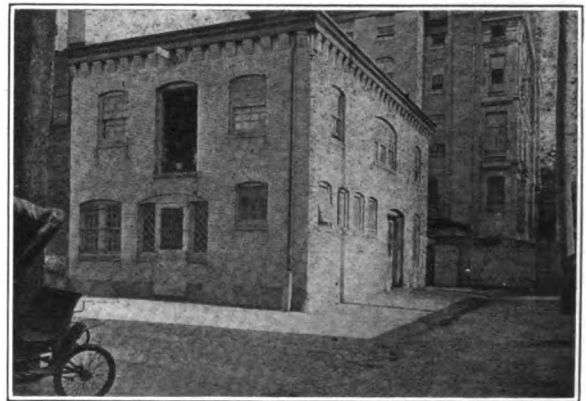
no possibility of noise, smoke or fumes penetrating to the residence part of the structure.

The distressing eccentricity and diversity in the size and shape of city lots rather complicates the problem of providing a private garage in many of the residential districts. Many an American mansion has as a setting a lot of irregular outline with a very limited alley frontage, and architects have, in many instances, been driven to their wits' ends to provide in such restricted areas, garages that would not appear incongruous as

adjuncts of the residences involved. Some very clever conceits have been worked out by providing low-roofed garages in harmony with the brick or stone garden walls which so often enclose the rear portions of city lots.

Where the owner of a car operates it himself or where the hired chauffeur does not live on the premises, the one-story garage still predominates. However, in the present strife for compact and comprehensive garages there is a marked tendency toward two-story structures in all cases where a pretentious or costly building is to be provided. The second story of such a building affords living quarters for the chauffeur. These up-to-date garages also have storage space or a repair shop provided in the basement. Even in the less pretentious one-story garages that are constructed in accordance with the latest approved ideas there is a pit underneath the car storage space so that repairs to the machinery can be made without moving the automobile. Some garages which are devoid of a court yard or other adjacent space are equipped with a concrete floor and drainage arrangement so that the cars can be washed when occupying the regular storage space.

Among automobile owners there is wide and very



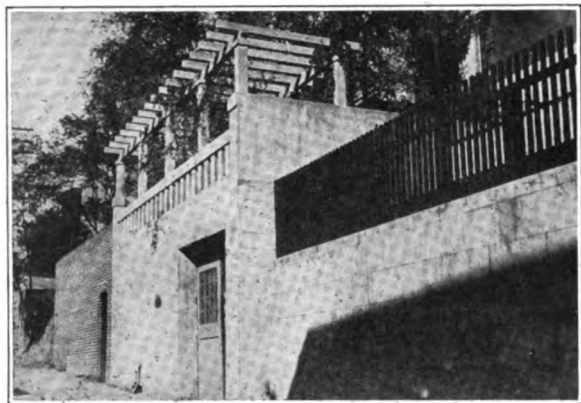
The garage of Secretary of State Knox at Washington, D. C.

pronounced difference of opinion as to the material best suited to the building of private garages. Very naturally there is in rural and suburban districts a tendency to erect frame structures,—shingle construction being popular in some localities. In such surroundings there are no building restrictions that prohibit wooden buildings and aside from the comparatively low cost of frame construction there is the consideration that such a garage can be completed quickly and that it can be made to conform in outline and decoration to the owner's residence, presuming the latter to be of frame construction also. Some of these same considerations have impelled automobile owners in the suburbs to provide "portable houses" of the type that has been gaining vogue in recent years.

However, frame garages are tabooed in many of our cities by building regulations, whereas in other communities the restrictions covering the storage of gasoline are such as to in effect debar wooden auto shelters. In such localities the private garages are of either brick or concrete or a combination of the two materials. The range of cost is best indicated by the fact that, to date, there have been constructed in the United States private garages, the outlay for which has ranged all the way from \$500 to \$30,000 each. Brick garages are numerous, but this is in part explainable by the fact that many present-day garages are transformed stables, the owners of which have sold their

horseflesh and substituted the self-propelling vehicles. In this category, for instance, belongs the garage of the President of the United States in the rear of the White House at Washington.

The fireproof character of concrete causes it to be generally regarded by authorities as a well-nigh ideal material for garage construction, but in its preferable



Concrete garage on a narrow city alley.

forms it is not as cheap as is often inferred. A concrete floor is now almost invariable practice even in garages constructed of brick. All the standard forms of concrete construction are being employed for private garages, including the solid wall, the hollow wall, concrete blocks and stucco construction. The buildings with solid walls, that is of monolithic construction, are desirable as absolutely fireproof but are quite costly. Concrete block construction offers many of the same advantages at less cost. Decidedly the most popular form, however, appears to be stucco which consists of a coating or veneer, preferably upon brick and which is favored alike for new construction and for the rejuvenation of old brick stables or other buildings which it is desired to transform for use as garages.

Four different surfaces of stucco are made use of in garage construction. By surface is meant of course the finishes applied to the final coat of stucco. The



An artistic stucco garage with red tile roof and of moderate cost.

various treatments are respectively the smooth finish; the rough or sand finish; the "spatter dash" finish; and the widely employed "pebble dash" finish,—the latter made up of one part Portland cement to three parts of coarse sand and pebbles not over one-fourth inch in diameter. A quaint conceit is found in the familiar type of private garage wherein the foundation and all four corners, from foundation to roof, have brick surface exposed, the remainder of the wall surfaces being stucco. An example of the possibilities of

the concrete garage in unusual surroundings is seen in the auto shelter at the new Beale mansion at the national capital. The rear of the lot rises sharply and the garage has been set into the hill but with the simple classical outlines only partially obscured. At one side of the garage and forming a part of the architectural theme there rises a graceful stairway which gives access to a garden and promenade on the hillside above the garage. Concrete garages are usually of the familiar grayish tint though yellow and ivory tinted walls are employed to some extent. Red tile roofs are preferred where expense is not held down too rigidly and the tile roofs are also utilized to some extent on brick garages although for these latter slate roofs are the generally accepted covering.

KICKS AND KINKS.

Carburetor Jets, Gasoline Leaks and a Cold Weather Hint.

BY JAMES F. HOBART.

It is the privilege of the American citizen to "kick" and it may be said that we are a nation of "Kickers" so frequently is the privilege exercised. But there is something more than a privilege attached to the matter of "kicking." To a certain extent it becomes a duty which no man should neglect. Hardly a single one of the many improvements, inventions and reforms which have been advanced, proven and accepted by the public to their great advancement, would ever have been perfected, or even thought of had it not been for the "kicking" of some good or bad citizen. It is the duty of every man, and each man as well, to "kick" when he sees something which should be or could be improved, some nuisance which should be abated or some person who was not conducting himself in accordance with the good of all. In such cases, "kick" and keep on kicking until results are obtained. People will probably call you a "crank" and kick you in turn, but never mind that. A "crank" anyway, is only a man who has different opinions from our own, or whose hobby differs from our particular pet one which we delight to ride regardless of the opinions of others. The "kicker" must expect to receive a few (and sometimes more than a few) kicks in return for those he gives, therefore fail not to kick when occasion demands, and persist in kicking until results are obtained. It may truly be stated that cranks make things go 'round, but it is also true that kickers start things going!

In accordance with this policy, I want to register a "kick" right here and now, in regard to the choked carburetor jet illustrated and described on page 285 of the October AUTOMOBILE DEALER AND REPAIRER. I have had no end of trouble with gasoline jets of this kind, and when making one for my own use, or for any person who desires immunity from this class of trouble, I invariably make the jet as shown by C, Fig. 1, herewith. The jet shown in the October issue was made about like the one shown at A, Fig. 1. Sometimes the body of the carburetor is made solid and a large hole drilled to B, a small hole being made through the end of the jet for the passage of the gasoline while the two sizes of hole are connected by a conical-shaped opening, more or less lengthy according to the whim of the workman who made the jet and—the reamer he chanced to lay hands upon.

Sometimes the jet would be made up from a casting which had been cored out to point B. Then, all that need be done was the running of the small drill into the casting until it intercepted the large hole. A jet

made in this way, needs an extra strong kick and the man who designs such a jet needs a much stronger presentation of a No. 10 shoe just under his coat tails. Jets thus cored and drilled, are sure to clog up if any dirt whatever chances to get into the gasoline. These jets are worse than the drilled ones, for the latter can be cleaned, while the rough walls of the cored-out chamber holds dirt and metal chips in spite of the most vigorous efforts to dislodge them. Therefore, do not core out the holes in carburetor jets or other gasoline passages. See that such holes are all well finished and smooth.

A form of carburetor jet is shown at C, which fails to clog even when used with very dirty gasoline. Indeed, the amount of dirt which can be in the gasoline and not clog one of these jets can only be realized by the man who has used them. This form of jet is called by the writer, the "eel-pot" jet, from its resemblance to the improved traps in which that slippery wriggle-fish is so frequently caught by the hundreds. As shown by the engraving, the large hole is drilled clear through the jet, and the delivery end is threaded and the reversed nozzle D, is screwed into place as shown. This device takes its name of "eel-pot" from the internally projecting nozzle at E, through which the gasoline must pass to escape from the jet. The eel-pot is constructed in a similar manner, the eels entering through the small orifice which is large and funnel-shaped outside, but terminates in a very small opening inside the ell-pot, as at E in the engraving. The eels enter the large opening and naturally squeeze through the small opening into the interior of the trap. The fools are unable to find the small opening by which they enter, and therefore remain in the trap until the fisherman (or some other chap) visits the eel-pot!

In the case of the gasoline jet, C, in the illustration, dirt or any other foreign matter which may obtain entrance to the jet, naturally gravitates to the bottom of the jet, if heavier than gasoline, and to the top of the hole if lighter, say splinters of wood, etc. In either case, the dirt has a poor chance of finding the very small opening, but collects at E, while the clean gasoline flows out through the small orifice. The screwed plug D, is readily removed for cleaning the large orifice, and it is astonishing what an amount of dirt will collect in the annular chamber at E, in a comparatively short time. No matter how well the gasoline may be strained, more or less dirt will find its way into the storage tank, and unless some sort of "eel-trap" as is shown above be continually set, the dirt will surely, at some time or another, get into the carburetor nozzle to cause trouble, stoppage of the engine, and to become a source of "kicks" innumerable.

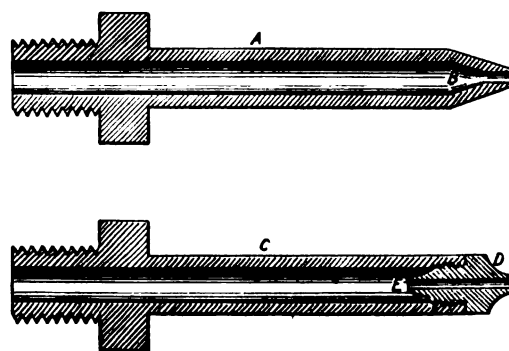
The progressive automobilist, as well as the progressive American citizen should realize that there are at least two kinds of "kicks," good kicks, and bad. The good kicks are those which have effect in aiding improvement and abating a nuisance; the bad kick is one which is made for the mere sake of kicking, with no endeavor or inclination on the part of the kicker to hit anything, or to start a movement toward improvement. This kind of a kicker deserves to have his legs tied, and he frequently gets what he deserves. The "good kicker" places his kick where it will do some good and start something or somebody to moving.

Therefore, when you find trouble in your carburetor jet, as noted, don't be satisfied to just kick the air, but place your kick in the shape of a demand for a better form of jet as shown by sketch C, Fig. 1. This is the

kind of kicking which is good. It is of some use to the world for it starts something doing.

A carburetor jet made in accordance with sketch C, with the hole as large as possible down to point D, will work equally well in a vertical position, or when laid horizontally. When laid horizontally, the dirt collects along the lower side of the large hole. When the jet occupies a vertical position, the dirt fall all around the little discharge nozzle while clean gasoline flows out. The limit of service, before cleaning is necessary, is the time in which the gasoline dirt will fill the space left for it, after which time, the level of the dirt deposit will be as high as the nozzle opening and the situation becomes the same as in the original jet, shown by sketch A. It is then in order to clean out the dirt at frequent intervals, which may have collected at E, sketch C, Fig. 1.

In all cases, when making a jet of this character, make the nozzle as large as possible, and let there be as much dirt-space at E as it is possible to arrange for. And this principle of dirt-arresting should by no means be confined to the carburetor jet. It should begin with the filling of the automobile gasoline tanks, and the merchant who sells the gasoline should have one of



Carburetor Gasoline Jets.

these eel-pot dirt-traps in his gasoline tank. A similar device should be placed in the gasoline tank where the supply pipe leaves the automobile tank for the carburetor. And there is a fine opportunity for another trap to be placed in the pipe somewhere between the tank and the carburetor. With these traps, and with proper cleaning as required, there never need be a stoppage caused by dirt in the carburetor gasoline jet.

STOPPING GASOLINE LEAKS.

Gasoline is one of the hardest substances to confine in tubes, or control by valves and gates, that can be found in the products of nature. Gasoline under pressure is about the limit when control thereof is desired. It will "sneak" through the smallest opening in pipe or in valve, and when it is supposed that the connections are absolutely tight, the gasoline may be taking a very short cut to places where it is not wanted.

When any of the gasoline connections spring a leak on the road, the stopping of the gasoline loss becomes a very serious problem and it is found almost impossible to do anything with the tricky fluid. It will leak out from under adhesive tape like water—much worse than water, for what will retain water with ease, seems to have no effect whatever upon gasoline and that fluid cuts adhesive tape to pieces about as fast as it can be applied to a leaky pipe.

One of the best—if not the best substance for closing gasoline leaks is common yellow soap. Rub this over the leaky pipe, working some of the soap into the leak, and coating the surface of the pipe to a con-

siderable depth—say $\frac{1}{8}$ -inch or so, then confine the soap by means of an adequate winding of cloth and you will be able to get home without further trouble.

A small quantity of calcined plaster (plaster of paris) may be carried with advantage whenever gasoline leakage is expected or has to be guarded against. A roll of muslin—a regular “surgical bandage” should be carried also. This may be a portion of the “emergency kit” carried by the autoist, in his “first aid to the injured” medicine chest. In fact, rolls of surgical bandage, from 2 to 4 inches wide are mighty handy things to have along. They are equally valuable for binding up injured limbs, or “fly-away hats,” or for stopping gasoline leaks as above noted.

To use the muslin bandage for binding up gasoline leaks, apply the yellow soap as directed above, being very careful to apply a plenty of it and to work it thoroughly into and around the leak. Then select and cut off a piece of the muslin bandage two or three feet long, according to the amount of pipe to be wrapped. Put a small quantity of calcined plaster in a dish, add water to cream the plaster, then daub the bandage in the creamy plaster and wind quickly and very tightly around the leaky pipe or other object. Pull the muslin very tight and keep it wet with the plaster and water. Rub and smooth the muslin down as smoothly and as close to the pipe as possible, applying more plaster and water as the winding proceeds.

Saturate the muslin thoroughly with the plaster water after the winding is completed, and finish by rubbing a little dry plaster over the surface of the bandage. This treatment will take up all the water which may be in excess upon the bandage and it also causes the plaster to harden more quickly than when an excess of water is present. In ten or fifteen minutes after applying the plaster bandage, the gasoline may be turned on with the assurance that it will not find its way through the soap-plaster bandage for many hours. Indeed, I have had such repairs stand up for weeks without the least leakage.

Should a pipe be broken completely off, wrap it with a bit of tin, brass, or sheet iron, which has been covered with soap. Failing to obtain a bit of sheet metal, use a common visiting card, or a bit of leather. Cover with soap and reinforce with two or three flat pieces of wood, fashioned much the same as the splints used in setting the broken bones of an arm or of a finger. Wind the plaster-soaked muslin over all, and see that it is stiff and good after the plaster sets. Unless sufficient plaster has been worked into the muslin to stiffen it well, there will be danger of the leak bursting out again.

Now, a little kink for winter, and perhaps a kick or two with it, and I'm done. At one time, before I got tired of working for a living, it was my lot to run a stave saw in a country saw mill, the doors of which were made up of blue air mostly and the ventilation of the mill was certainly immense. But “yours truly” was always comfortable, even on the coldest day, while the other boys were whipping their fingers and stamping feet most of the time! How did I do it? Why, I just ran a little $\frac{1}{8}$ -inch pipe to the exhaust pipe of the engine and connected it with a little flat “coil” which was made of elbows, nipples and short pipes. This radiator was buried in the sawdust under my feet and a few boards thrown on top of it. The sawdust became so heated that the coil never froze up over night, and all day long it was nice and warm under foot. When the weather was warm, a little more sawdust and a few more boards over the radiator kept the temperature down so that it did not “tingle” my

feet. When it was cold the coil would be uncovered a little. It was astonishing how the other boys all patterned after my “foot-warmer” and we were by far the most comfortable gang in any mill in old Massachusetts.

Now, then! Why in the mischief don't you automobile fellows who like to be nice and comfortable while riding in the winter—why don't you get some copper or brass tubing, wind up some cute little flat radiators and stow them away in desirable places in your car? By means of a valve, you can at will, turn the engine exhaust, or a part of it, into these little coils, and the manner in which they will heat up the car is not to be believed until you have tried it. But be sure and put the valve in such a position that it may be controlled readily from the driver's seat. There are times when some of that “one-third of the total heat units in the gasoline” is too much of a good thing, even for a cold day and you don't want to get out of the machine and turn a valve somewhere down below, every time the heat is to be regulated! No, put the valve handy, and don't forget to run a few coils of exhaust pipe under your own feet or seat.

An arrangement of this kind makes one of the best mufflers you ever saw. And you don't have to put all the coils in series, either. You can place them all in “multiple” and work separate valves for each coil. Then you can control the heat exactly as you please. And when piping the exhaust around the car, did you ever think what it would mean to have the carburetor surrounded by a coil through which the hot exhaust could pass? Well, if you try it, you will be able to almost run the car with ordinary kerosene instead of gasoline, so much does it help the gasifying of the kerosene. And it works just as well when some poor gasoline must be handled. Just try it. It won't cost much, and the manner in which it makes “lean” gasoline come to time, is very gratifying, to say the least.

One chap piped the radiator water around the car, but after it froze up a few times, he got tired of it. But the gas engine exhaust never freezes and it is hot—mighty hot.

A Switch Tip.

Expensive switches are now marketed for dual ignition, which enable the driver to employ magneto and accumulator ignition separately or together, and even to use either of two accumulators or both accumulators at once. But these switches are decidedly costly, and certain makers prefer to fit two or three separate switches. A car fitted with a series of separate switches is a dangerous possession. For instance, the spark must be fully advanced for starting up on the magneto, and tolerably retarded for starting up on the accumulators. Sooner or later the driver is pretty sure to approach the starting handle with both switches “on,” and the spark full forward, when a broken wrist will very likely be the sequel. In the absence of a composite switch, great care in inspecting the position of the levers is necessary, before a finger is laid on the starting handle.

Gasoline Fire.

In case of a fire from gasoline should break out, do not waste time by throwing water upon it. Gasoline is lighter than water and since the two liquids will not mix the gasoline will float, and throwing water upon it further agitates the gasoline, causing more gas to be given off, consequently there will be more fire instead of less.

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ADVERTISING RATES MADE KNOWN ON APPLICATION

NEW YORK, NOVEMBER, 1909.

Missing Numbers—Our readers are requested to remember that it always gives us pleasure to re-send numbers which have gone astray in the mails.

The Automobile Dealer and Repairer in Australia and New Zealand.

Mr. R. Hill, Matlock House, Devonport, Auckland, New Zealand, is our accredited representative in Australia and New Zealand for obtaining new subscriptions.

LICENSE AND THE PUBLIC SAFETY.

Let any one drive and operate an automobile who can get a chance. Examinations and licensing are no public safeguard. If danger and damage depended upon the engineering skill of the driver, or upon his knowledge of the mechanism of an automobile, or his experience in driving it, there would obviously be but one course to pursue, and that would be to have a rigid official examination to determine the ability of the applicant for a driver's license.

But the liability for accidents depends far more upon the general character and temperament of the driver than upon his engineering or mechanical ability. No examination can be conducted that will determine whether the man examined is careless or careful; nor is it, as a rule, the inexperienced car driver that meets with an accident. It is rather the one who "knows it all"—the man who has knowledge of car running "at his fingers' ends," and who can "take a turn on two wheels" or drive within an inch of an obstruction and not hit it—who has most accidents and whom the public has most to fear.

But it will be stated that one must have a license to run a stationary engine, why not an automobile, which requires more knowledge and skill? We reply that the conditions are by no means parallel or even similar. Nine out of ten automobile accidents arise from carelessness, pure and simple; upon indifference rather than upon lack of knowledge; nine out of ten accidents from stationary engines arise from lack of knowledge rather than from indifference.

The operations of starting, stopping and guiding an automobile are by no means difficult. They can be learned in anywhere from an hour to a half day, and about as quickly by a man who knows nothing about the mechanism of a car as by one who can design and make one. And yet, the starting, the stopping and the guiding are all the public has to fear.

Why then should an examination by an official board of engineers be any test of a man's ability to run a car with safety to the public? Although it is true that one who knows nothing about the mechanism of an automobile or of mechanics is liable to ruin it in a day or a week, this is no concern of the public, the question of the safety of others being the only one which can or should be provided for.

The simplest and most effective way to protect the public is to make the penalty for accidents a long term of imprisonment as well as a fine. By the license plan, many a man can secure official permission to run a car to whom the only repelling force to recklessness and the consequent disaster would be the fear of suffering a long term in jail as a penalty.

TIME, PLACE AND USE.

Occasionally some reader asks us to print automobile racing results, and some go so far as to suggest that we have a department of aeronautics. We are reluctantly obliged to refuse such requests. The first named feature is fully covered by the daily press, and to reprint it just after it had been thus exploited and after our readers who are interested in such matters had obtained all the facts in their morning or evening paper, would be far more trite and hackneyed than to print a chapter from the First Book of Chronicles. As to aeronautics, we fail to see how it has any more connection with the automobile than so much railway or steamship news.

But our readers need not think for a moment that we belittle the importance of racing as it applies to the general welfare and use of the automobile. Indeed, we would not advise the purchase of a car unless it has done something, or unless it can be demonstrated that it can do something—either on the road or on the track. It requires an engineer and a good one to design and build a car that can make a place for itself on the track, and an equally good one to build a car that can make a record in an endurance run up hill and down dale across the country.

Unless a manufacturer can show that his car can actually accomplish something worth while in actual service, either in the matter of speed or of endurance, he stands little chance of keeping up with the procession.

But the publishing of automobile racing news is no part of the mission of this journal. Those who are interested enough in such matters to read the details or the results will be sure to get them in the daily papers from a day to four weeks earlier than a monthly magazine can put them before its readers, and those who are not so interested would be justified in sending in a good strong protest if we attempted to cover them.

GASOLINE AND SPEED.

Thus far no clear and conclusive demonstration or test has been made to determine how much more gasoline it requires to drive a car a given distance when going 50 miles an hour than when going 25 miles an hour. It is well known that at the speed of five miles an hour it would require more gasoline to go a certain distance than when going 25 miles an hour, but when it comes to the higher speeds the facts have not been so well demonstrated.

But it is clear enough that the car itself will last far longer if driven at a slow speed rather than at an extremely rapid one. It is likewise well known that the tires last far longer with slow than with fast speed.

CARS FOR 1910.

Despite the reports that manufacturers will not be able to fill orders, those who intend to buy a car for next season need feel no uneasiness. There will be cars enough to fill orders, although this is not in accordance with the statements of some of the manufacturers. One big maker said recently:

"Our output has been doubled and yet I am compelled to take but one-half the number of cars we sold in New York last year. The season of 1910 is a closed book with us right now, for all our allotment has been sold for the New York territory. Our agents demanded more cars and had we refused they would have tried for other agencies."

The situation with this maker is the same as that of some others of the makers of the better known and more popular cars, but new manufacturers are constantly coming into the field, and while intending purchasers should thoroughly investigate the new and somewhat untried car, it is always possible to get something superior from some manufacturer who has yet to earn his spurs.

Moreover, mechanics and designers are studying the self-propelled vehicle as never before. Chassis, wheels, tires and bodies have been the subject of no end of thought, and although apparent perfection is a long way off, improvements from now on will come slow.

SELDEN PATENT ROYALTY.

Since the circuit court has sustained the validity of the Selden patent in the suit for infringement, although it will be carried to the Supreme Court, some of the smaller manufacturers have joined the ranks of the Licensed Automobile Association, quite likely with the idea that as long as the case has thus far gone against the independents, it is better to acquiesce than to stand the chance of finally being driven into the fold of the licensees. But there are two other reasons for this course: The royalty exacted by the Seldon company is one per cent. upon the manufacturing cost of the car, and this is not a heavy tax from a money viewpoint, although the aggregate, both retroactive and potential, in case the patent is sustained by the highest court, will be enormous. And moreover, the Licensed Automobile Manufacturers offer some advantages as an association for concerted action, especially in the way of curtailing output and fixing prices. And no matter how much purchasers or consumers may regret steps of this kind, they are bound to be taken sooner or later.

AUTO LIVERIES.

The old-fashioned livery stable is doomed. The extension of the street car service hurt it somewhat, but the automobile and the taxicab have just about put it out of business. Well, it is just as well. The livery horse was always a poor and abused creature, the victim of ignorant and inhuman drivers, and it is gratifying to know that the animal is becoming emancipated from his cruel masters.

One gratifying fact is that although the automobile may be abused in about the same way that the horse is abused, it is not a living thing, and if ruined by hard and reckless driving the injuries come right back to the owner, where they belong.

But the auto livery business will be far more profitable than horse livery. For when a car is in the stable it requires neither exercise, care nor feeding and its deterioration is a mere bagatelle compared to that of the horse.

LESSONS FOR DRIVERS.**Carelessness and Ignorance Responsible for Most Accidents.**

Probably more accidents have occurred because of the driver failing to stop the car, when a stop could easily have been made and was the thing to make, than from any other source. Just how many lives have been lost and cars wrecked from a failure to stop when danger was ahead it would be impossible to compute, but it is safe to say that the neglect to do this very reasonable thing is responsible for more disasters than all other causes combined.

Of course any driver knows how to stop—after a fashion, and as a last resort—but stopping should be the first resort in case of danger. And it should be the first impulse of the driver; it should come to him naturally or by instinct rather than by any process of reasoning.

Now any one can stop a car in some way—given time enough and distance enough—but few can stop quickly and in the best way. Yet this is the most important thing a driver can learn. If the car must be stopped suddenly the impulse of the half competent driver is to jam down the clutch pedal, grip the emergency brake lever, and stop the wheels from revolving. The motor, being relieved of its load, will begin to race, the flywheel will spin around with increasing velocity, and you are lucky if the car does not skid around, hit something, and turn turtle with you underneath. The effect of this sort of stop on the tires should be a sufficient consideration for you to refrain from cultivating it to say nothing of the danger to life. If, on the other hand, you first close the throttle, then throw out the clutch and apply the brake just hard enough to allow the wheels barely to revolve your car will come to a safer and speedier stop without strain. The motions to accomplish this must of course be practically simultaneous, but they are no more difficult than those required for the wrong sort of stop. But it requires much practice to stop correctly and quickly, and still more practice to get so accustomed to stopping when danger is ahead that the movements will be by intuition.

Of course it should be well known that applying the brake when a car begins to skid causes it to whirl or slew around sometimes causing it to face in the opposite direction. For this reason the brake is the last thing to use to correct the tendency to skid—just as it is the very thing that the driver, if inexperienced, is most apt to do. Only by combating this desire can he escape danger or injury. Drive slowly when skidding conditions are encountered; drive in a straight line as long as possible, and when it becomes necessary to deviate from it turn slowly and carefully and correct any tendency to skid in one direction by steering very slightly in the other. Do not under any circumstances put the brake on hard and check the speed as far as possible without it. If the car gets beyond control from skidding, bring it to a stop as quickly as possible without resorting to the brake, except very gently. We have space but for a few accident lessons this month, but they speak volumes in the sense of warning to careless driving:

Raced With a Train.—Dashing at full speed toward a railroad crossing on Long Island in a desperate attempt to get there first, two men were killed and a third mortally injured when their automobile was struck by a train on the Long Island Railroad. The train was running at high speed over the meadows.

In the opposite direction and parallel with the tracks came the automobile, raising a cloud of dust as it swept along the highway. Persons near the crossing held their breath as the touring car and the train approached the crossing. "It is a race with death," went up the cry as the automobile with the three persons in it, seemingly oblivious of their danger, took the easy turn in the road and flashed up on the tracks with a leap that lifted the wheels from the ground and sent the machine a foot in the air. The next instant the pilot of the locomotive struck the auto and sent it hurdling thirty feet, a mass of smashed steel and woodwork. That the owner of the car was driving it at breakneck speed, was racing with the train for the crossing, is attested by a dozen witnesses of the accident. The country for miles around in every direction is almost as flat as the surface of a billiard table, so that the engineer and the chauffeur must have seen each other's machines for a long distance before the collision took place. The engineer blew his whistle repeatedly but no attention was paid to it.

Failed to Disconnect the Clutch.—Unchecked in its speed because the chauffeur failed to disconnect the driving shaft from the clutch although he tried to do so as he leaped from his seat to save his life, a ponderous automobile truck, enveloped in sheets of flame, sped through Twelfth street, in New York, stopping only after it had crashed several times into the railing surrounding the home of Mr. Thomas F. Ryan and that of the Fifth Avenue Presbyterian Church. The car was destroyed.

Jumped and Was Crushed.—In Chicago a man and his wife with their child were in an automobile when a taxicab was seen coming. A collision seeming to be inevitable, the woman jumped, falling in front of the taxicab. The wheels passed over her head. Her skull was fractured and she died at the hospital two hours later. She was holding her baby boy in her arms when she leaped, but threw the child clear of the taxicab. The baby landed on the grass plot between the curbing and the sidewalk and was not hurt. He was thrown ten feet. The child was taken away by relatives of the dead woman. The police said that the baby was not even bruised or cut.

Hurled Into a Tree and Hung There.—In the suburbs of New York an advertising agent was out for a morning spin with five companions, when suddenly the steering gear went wrong. The driver struggled for several blocks with his wheel, but it would not work. He was about to stop his engine when there was a sharp crack and the heavy car skidded to one side of the roadway and crashed head-on into a tree. The only one not thrown out was the driver. He was wedged between the tree and the steering wheel. After the men had been bandaged up they discovered that one was missing and were just a bit worried. They went back to the tree, where a crowd still was grouped about the wrecked car. They searched for many minutes without finding a trace of the lost man.

"Say, mister, what's that up in the tree there," said a boy. One of them glanced up and shouted excitedly: "Boys he's up in the tree!"

Ladders and ropes were obtained, and the special policeman, still unconscious, was lowered to the ground. Two of his ribs were fractured and he was cut in several places.

Wheel Strikes a Hole.—Near Youngstown, Ohio, an automobile party consisting of six men, were bowling in a haphazard fashion when the front wheel on the left side of the car sloughed into a deep hole between

the car track and the pavement. The sudden stop overturned the machine and threw the occupants to the pavement. Three were taken to the hospital but the other three were able to limp home.

Bursting of a Tire Causes a Serious Accident.—In Scranton, Pa., the mayor of Carbondale was driving around a sharp curve in the street when the friction and twist in the tire caused it to burst. The machine skidded into the curb with such violence that it was overturned. The occupants were thrown to the pavement and all more or less seriously injured.

Fatal Trial of a New Car.—At Oakland, Cal., the manager of a car company was giving some friends a ride in a new model and was going at a high speed, when in making a sharp curve, the car skidded and hit the curb. The momentum sent it in another direction where it hit a hydrant with terrific force, throwing out the party, killing two and seriously and perhaps fatally injuring others. It was of course the result of pure recklessness, and it supplies another to the long list of lessons against taking curves at high speed.

Trying to Pass a Wagon.—At Greenville, N. C., two men were killed and another seriously injured, when an attempt was made to pass a wagon. In some way the driver lost control of the car and it struck a tree with terrific force. It is stated that the car was not going at a rapid speed, but hitting the tree head on made a tremendous shock. Even though a car is not travelling at more than six miles an hour, if brought up instantly against some immovable body the shock is awful.

Result of a Broken Steering Gear.—In Brooklyn, N. Y., a party containing three men and three women were driving at a lively clip when the steering gear snapped. The car swerved like lightning and ran into a wall with terrific force. Then it rebounded and turned turtle. It threw five of the party over into a cemetery, but the other remained in the car and was pinned down so tightly that it required some time to drag the dead body out. Two others may die of their injuries.

A Co-operative Movement.

The Buick Auto Supply and Garage Company has organized for co-operative purposes, the main office being in Saginaw, Mich., and branch offices and garages are to be established in every State in the country. The idea is to make possible the purchase of all accessories and supplies for the automobile at a minimum cost; at any time; at any place and for any automobile made; direct from the factory to the owner. The garages will be open to the public, but those who are not stockholders will not, of course, share in the reduced cost of labor and supplies, or in the earnings or participate in the annual dividends.

Do Not Obstruct the Road.

When stopping for any cause automobilists should bring the car over to one side of the road so that it will be out of the way of other traffic and not leaving half the highway only clear, but practically the whole of it. In doing this a position should be taken up so that when the car is started again there will be no difficulty in getting under way.

Although the two-cycle type of engine is being used successfully, it is generally conceded that it will consume a little more gasoline, power for power, than the four cycle engine.

A PROFESSOR OF CADILLAC.

How He Came to Be Qualified for This Degree in the Hard School of Experience.

From John M. Stone, New Straitsville, Ohio.—I notice in the last few numbers of THE DEALER AND REPAIRER that a few of the people who own single-cylinder Cadillac machines are having troubles of various sorts, all of which I have experienced with my machine of that make, and which I was obliged to work out by myself, the garages to which I dragged the car being able to do nothing with the main troubles, but giving the car what they termed a general overhauling and charging a good price for the same, although the machine did no better after that than before they worked on it—and me.

I bought the machine second-handed and it had been used several years. The first trip of 50 miles was made without any serious trouble, but on the return trip my troubles started.

The motor would run apparently all right and would build up to speed and would pull the machine all right on low gear, but the moment the high speed clutch was slipped in the power would gradually die away until with a series of heart rending "pops" back through the carburetor the motor would stop dead. After perhaps a half hour of persistent cranking the engine would start up and run merrily along until maybe two or three miles had been covered when the trouble would re-occur in the same manner.

I "made it" into a good sized town in the center of this State and when the motor died (right on the public square, of course), I telephoned a garage and had the blamed thing hauled into the repair shop.

The machine remained in that shop for five weeks, when I was informed that it was again ready for the road. I went after it and started on a 30-mile trip home at 7:30 a. m. and had gone but a few miles when the missing fire again started and it was nine o'clock that night when I finally finished up the trip.

The garage charge for overhauling was something like \$25.

A few weeks later a friend and I were working with the machine and discovered the cause of all the trouble. The inlet valve was not performing its functions. It would open with the suction of the engine sometimes, but the push rod which is supposed to actuate it was wholly useless. We cut out a few small pieces of tin which we inserted under the roller slide which works this rod, taking care not to get too many, but just enough to open the valve about a thirty-second of an inch when the throttle was in closed position, then as the throttle was gradually opened the motor built up all kinds of speed and power and I never had another bit of trouble from that source.

Had one experience with losing power which was caused by the clutch rings becoming worn so that they pressed against the shoulder of the clutch instead of on the ball races, but this was remedied by having a washer of tempered steel made so that it slipped over the clutch sleeve, working against the outside balls between the regular ball washer and outside clutch ring.

Care must also be taken in the adjustment of the slow speed and reverse brake bands around the transmission drum. These are easily bent and if they do not clear the drum all round when the neutral position is on the motor will pull all right on slow gear and probably on back up, but a drag can be felt the mo-

ment high speed is shifted in, and this will gradually drag the motor down until it is necessary to shift into low speed to keep moving at all. These bands must be kept in good shape and the brackets which support them must be kept tight. Nothing must be in contact with the transmission drum when the motor is running idle.

The overheating of the circulating water also gave me much trouble and it took at least four months figuring and experimenting until I struck the right idea.

The hose which connect the radiator with the tank and motor pipes drop down and usually make a U-shaped loop before they are slipped over the end of the pipes. It is this loop, or trap, that causes so much trouble with Cadillac cooling system.

I removed these hose and inserted a long L into the left hand connection of the water tank, making a straight line connection with the radiator. Straightened all other hose lines so that the water ran in as straight a line as possible, and my hot water troubles were at an end.

I may say in passing that I spent considerable money and used three different makes of circulating pumps before I found out the "nigger in the woodpile."

I have had so much experience in straightening out Cadillac troubles that I feel qualified to call myself a Professor in Cadillac Troubles, and will be glad to personally answer any queries from single cylinder Cadillac owners who will enclose postage for reply.

Hoping that you may find room for this lengthy letter in your excellent journal, and that my experiences may help some other poor devil who is worrying himself gray headed.

LOCATING TROUBLES.

Do Not Interfere With the Carburetor Except as a Last Resort.

Recently a party purchased a new automobile and not having any knowledge about gas engines did not know what to do when the motor began misfiring and finally stopped altogether. The garage was called up and a so-called repairman sent to locate the trouble. The repairman at once changed the adjustment of the carburetor, informing the owner of the car that such was necessary at this season of the year. The carburetor worked excellent up to the time when motor refused to run. The repairman also installed a new set of dry batteries. The motor then ran for a short distance and then began mis-firing and losing power as in the first place.

Before sending to the garage again the owner mentioned the incident to a party having two cars of his own, and, as this party was familiar with the car in question, he volunteered to look it over. On investigation it was found that the needle valve of the carburetor had been opened too far, causing an excessive flow of gasoline which resulted in flooding, etc. The actual trouble was found to be caused by a high tension wire attached to one of the spark plugs being grounded on the steel frame of the chassis through defective wiring, allowing the insulation to wear off badly on the under side of the wire. The wire was renewed and completely fastened to keep it firmly in place and clear of all metal. No further trouble was experienced with the exception of the readjustment of the carburetor.

It is very discouraging to owners to be placed at the mercy of the garage men who employ inexpe-

rienced mechanics and it is such cases as the one noted above which causes the owners to lose faith in the garage men entirely. A good motor can soon be ruined by allowing inexperienced men to experiment with it.

It seems that the majority of these inexperienced men start to interfere with the carburetor first, either through ignorance or with the hope that the owner of the car will have to return soon to be mulcted out of more money for fake repairs.

All those new in handling of an automobile should study the electrical connections thoroughly and it will be an easy matter to locate quickly the simple troubles caused by loose connections or grounded wires. Do not allow the wires to become soaked with oil and grease as this will rot the rubber insulation and cause short circuits. Keep all wiring away from metal surfaces and as dry as possible, separating the wires as much as space will allow. If the terminals are loose and drop off the spark plug easily through vibration, drop a spot of solder—only a small amount—on the terminal at the plug. The solder can be easily cut off with a knife when you wish to remove the plug. Keep the storage battery well charged and use it in preference to the dry batteries which should only be used in emergency.

The principle rule to remember is not to allow the repairmen to interfere with the adjustment of the carburetor until the last resort, as the manufacturer has undoubtedly had the carburetor adjusted by an expert and well tested before the car was delivered.

PROGRESS IN TRAVEL.

Food for Thought at the Opening of an Automobile School.

At the recent opening of the automobile school of the West Side Y. M. C. A. school in West 57th St., New York, some instructive and absorbing addresses were made by those who by experience and observation are qualified to discuss subjects relating to the automobile and its uses. Among the subjects treated were the automobile driver and the policeman by William McAdoo, formerly police superintendent of New York, and the automobile and aeronautics, by Augustus Post. Among the points of general interest made by Mr. McAdoo were the following:

"The automobile driver and the policeman does not sound very harmonious. There is a great responsibility resting upon both, but the larger responsibility is that of the chauffeur. In his hand is the power of life or death. By the turn of his wrist he may take out of this life a bread winner. New York pedestrians have been made safer by the traffic regulations now in force. People are often careless and indifferent, and the auto driver has to be wide awake and ready to meet every emergency. The policeman's duty is not alone that of arrest, but he has the power to make the chauffeur obey the law. There ought to be a co-operation between the chauffeur and policeman.

"The policeman is one that has many temptations put in his way. I know of one case where a policeman stopped a speeding party, and one of the women of the party said, officer I believe that your eyesight is a little bit bad, can you tell me what that is lying in the road. There was a fifty dollar bill which he picked up and threw in the automobile. In a great many cases checks have been sent policemen by violators of the law.

"They have a system in London, however, which I

think ought to be in vogue here, and that is a system of licensing the auto drivers. There his whole pedigree and his character is inquired into, and a license granted to him, when he proves his ability. His picture appears on the license, so that a policeman can detect at once if he is the proper one to hold the license. The police can mark a reprimand on the license, so the next policeman can see it. Licenses are often revoked for drunkenness. Thousands each year come back asking to have their licenses regranted to them again. I know of cases where men's licenses have been revoked for taking people over the longest route to get to a place. The best conditions can only be secured when the policemen and the auto driver work together harmoniously.

"The greater responsibility after all lies with the chauffeur, who does not hold us in the hollow of his hand, but he has the power in the twist of his thumb."

In his address Mr. Post made, among others, the following interesting observations:

"The analogy between the development of the automobile and the development of the airship is very marked. It is the next step in the progress of the world and in the perfecting of transportation. It is evident that the present perfection of the gas engine has come as a result of its use in the automobile.

"The automobile has prepared the way for this new creation. The automobile will do what no former vehicle could possibly achieve, and the flying machine will outstrip the motor car as the motor car has surpassed its predecessor, the horse. The limit of the flying machine according to a statement made by Mr. Wilbur Wright, based upon his present experience and knowledge of what has already been done, is that the aeroplane can be built to attain a speed of one hundred miles an hour and to continue for one thousand miles and carry six passengers. This certainly would cause a wonderful change in the present conduct of the world's affairs. Mail could be delivered in one-half the time, business men could almost be in two places at once; they might even live in Philadelphia and do business in New York as easily as they now come from their suburban residences, for it takes an hour to go from one end of this city to another.

"Rules of the road, or rather of the sky, will be enacted. Lights will be required to be carried on the machines, which may be seen from above and from below as well as from the side. A certain distance must be kept between machines so that the wind wash from one will not interfere with following or passing aeroplanes. At Rheims the blast from the propeller of one machine forced one below it to the ground and a serious accident was narrowly averted.

"In legislation the history of the automobile may be duplicated. It looks as if there would be a similar series of legal obstacles to make even the sky less free than it is at present. No one ever thought that the air could be used for a highway, and each landowner was naturally assumed to own the air above his property, even to the highest heaven.

"In such a case a balloonist or aviator technically breaks the law whenever he crosses an owner's boundary line without permission. Like the rider of the bicycle, who could not legally go on the sidewalk nor on the road, the aerial navigator has at present no rights at all. We must condemn the air or decide that it is like navigable rivers and the sea, free above the point where man can build and control. It even looks as if the situation would be analogous to the Selden patent case on account of the basic patents held by the Wrights, which they are now desiring to uphold.

THE REPAIR SHOP

THE CHAIN DRIVE.

Tendency to Wear and How It May Be Avoided By Enclosing.

BY SYDNEY F. WALKER.

This is another of the engineering problems that so constantly crop up in the course of the improvements that take place in every branch of engineering. The question is, which is the best transmission, a live axle, with a pair of beveled wheels taking motion from a single beveled wheel at the end of the shaft, or a pair of chains and sprocket wheels on the driving axle? As in so many other cases, it is not possible to say that either of the methods is best. It may be possible to say that either method is better for one kind of car, or for one kind of work, than another, but that is all that is possible.

Again, so much depends upon the conditions under which both the shaft drive and the chain drive are worked. It may be said at once, that an unenclosed chain drive is inferior to a shaft drive, because of the increased friction that is set up by the dirt which gets in between the sprocket wheel and the chain. The chain drive is highly efficient, providing that no outside sources of friction are introduced; but if the chain is unprotected from the dirt of the road, the efficiency of the drive is considerably reduced. The efficiency of the drive, where mud, and dirt and grit are allowed to get in between the links of the chain and the teeth of the sprocket wheels, is reduced from two causes. The dirt itself sets up friction between the teeth of the sprocket and the rollers of the chain which have to move over them, in getting into and out of their places on the wheel, and, in addition, the presence of dirt and grit leads to wear of the teeth of the sprocket and of the rollers, with the result that the chain "stretches," as it is called. Of course it is well understood, that the term is a misnomer. Steel does stretch slightly, under strain, but the stretching of the chains which run over sprocket wheels, is really due to wear. A very small fraction of an inch of wear upon each tooth, or each roller, when multiplied by the number of the links, and the number of teeth in the sprocket, produces the lengthening effect known as stretching. The result of stretching is the production of shocks, as each link falls into its place on the sprocket wheel, and, in addition, it throws the work of driving on to a few of the teeth of the sprocket, in place of being distributed over the proper number.

In Fig. 1, at the points marked AA, the drive should be by metal to metal, with an oil film between. If dirt gets in at these points a certain amount of grinding must take place on both surfaces, accompanied by friction. Also if dirt gets in between the rollers and the bush on which the rollers turn as at BB, friction and wear again arises. Fig. 2 shows the effect of this wear in lengthening the chain, and Fig. 3 shows its effect in causing a few of the teeth, and a few of the rollers, to perform the work of driving, in place of the proper number.

For efficient work, the work of driving should be distributed over as many of the teeth of the sprocket as

possible. The number over which it can be distributed depends upon the proportion between the driving and the driven wheels, but in all these cases, there is a minimum number on the smaller wheel, beyond which it is not wise to go. When the sprocket and rollers are worn, however, the whole arrangement devised by the manufacturer is upset, and the work is put on to a small portion of the circumference of the wheel, and on to a small number of the links of the chain, and this leads to a further amount of wear, to a further stretching, and so on.

The question of alignment also, it need hardly be said, enters very largely into the problem. If the driving and driven wheels are not properly in line with each other, and are not maintained properly in line with each other, increased friction will be set up in every part of the chain. There will be an increased pressure between certain parts of the rollers and their

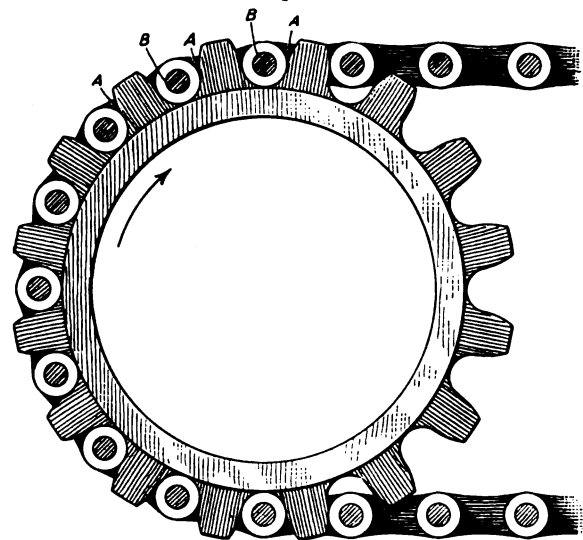


Fig. 1.—Diagram showing sprocket wheel with chain in perfect mesh.

pins, between certain parts of the rollers and certain parts of the teeth of the sprocket, and so on. And the worst of all these things is, they tend to go on increasing. A slight amount of wear leads to a further increase of the trouble, by putting the parts which wear further out of line, further increasing the pressure causing the wear, and so on.

In modern chain driven cars, oil tight cases are now the rule, and they can hardly be too strongly recommended, but it must be thoroughly understood, that to be of any service, they must be oil tight. Again the question of expense comes in. It is much cheaper to fit an uncovered chain to a car than a covered one, and it is much less trouble. Further, careful instructions are given for cleaning the chain at intervals, by boiling in oil, etc., and strong recommendations are given to motorists, to do this once a week or so.

The very best recommendation that can be given to a motorist who thinks of buying a chain driven car is not to have one with an uncovered chain, and to make sure that the chain case is thoroughly oil tight. If the oil can get out, dirt can get in. With uncovered chains, it is supposed that thoroughly steeping them in oil, getting the oil into every part of the chain, be-

tween all surfaces which work upon each other, will guard against the troubles which arise from the presence of dirt. It is quite correct, these precautions will do so, until the oil works out, and the dirt works in, and under most road conditions it is not long before the oil has worked out, and the dirt has taken its place. The fine dust which is created by motor cars settles upon every surface, and particularly upon oily surfaces, and the presence of oil on the chain, attracts



Fig. 2—Diagram to show the so-called stretching of chain, the space worn purposely exaggerated.

the dust, and the oily surface acts as a path for the dirt, by which it will find its way into the bearing surfaces. With an enclosed chain, in which the case is not thoroughly oil tight, the effect is merely deferred, and is often much worse when it does take place. Boxing up any piece of machinery, to be effectual, must be complete. If the chain case is not oil tight, if there are any crevices through which oil can escape,

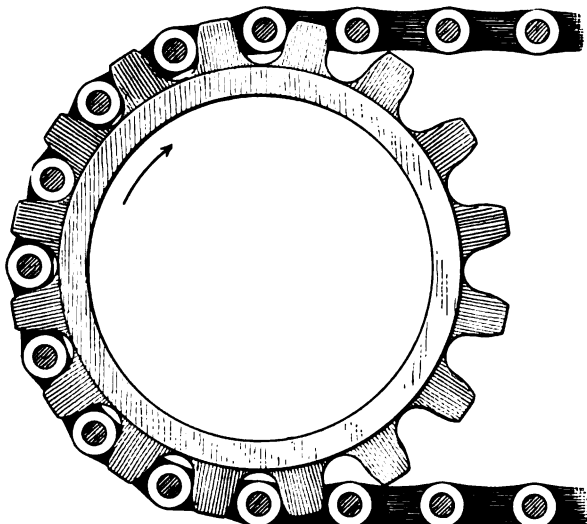


Fig. 3—Diagram to show how the wear of the sprocket teeth and roller pins alters the nature of the drive.

dirt will work its way in through them, and all the troubles that arise with uncovered chains, will ensue, but with the aggravated condition that it is not so easy to remove the case, as when the chain is uncovered.

Misfires at Starting.

It is noticeable that the engines of certain cars invariably misfire when first started up, and that the driver has to race them for a minute or two to obtain regular firing, to the annoyance of himself and anybody else within earshot. Some owners imagine that this misfiring is inseparable from a carburetor which normally uses hot air, and has naturally to depend upon cold air till the exhaust gases have warmed it up. As a matter of fact, these misfires are almost always due to the automatic air valves; the throttle is opened too wide before jerking round the starting handle, and as a result the pull of the engine sucks open the air valve, without dragging through enough gasoline vapor to make a properly combustible mixture. The cure is to only open the throttle a quarter, a third, or a half, as the case may be. The pull of the pistons will then provide a rich mixture, because it is insufficient to suck the air valve open.

CAR PAINTING.

Filling and Surfacing and the Importance of Roughstuff Emphasized.

BY M. C. HILLICK.

Ways fairly innumerable are described for rounding out the automobile surface and giving it the proper finish, but none of them, so far as we are aware, provide for the elimination of roughstuff, except in cases where the vehicle is merely put in shape for selling purposes. A good deal of misunderstanding exists concerning the character and utility of roughstuff which misunderstanding needs to be cleared up somewhat in order that better results may be had from the use of this important, and, as we believe, indispensable material.

Roughstuff is not, or, at least, should not be what its name naturally implies. Nor is it merely a leveling up material with a capacity for imparting to the surface some measure of smoothness. It is all this and more. Roughstuff is rather a coarse material when its atoms are considered individually, but the automobile surface is just now deserving of a roughstuff in which the atoms are ground fine and lie close together, and, all things considered, the finer and more compact the material the better the surface is bound to be.

Roughstuff, in addition to serving as a leveling and smoothing up material, is expected to furnish a durable and substantial foundation to color and finish upon. This latter office it cannot perform unless it is made up of approved ingredients carefully put together and properly applied. Roughstuff has often been made in its liquid parts of slop varnish, turpentine, and japan, whereas all these ingredients should be strictly in their original state, clean and wholesome. Where the surplus odds and ends of liquid mediums are used you soon have a roughstuff of unknown composition.

First of all, having secured a roughstuff of good quality, it should be ground fine enough to insure application to the surface free from brush-marks, after having been, of course, beaten out to a free brushing consistency in turpentine. Apply the "stuff" with a soft, chisel pointed, oval bristle brush, laying each coat off in an opposite direction from its predecessor. That is, for example, lay the first coat off with horizontal strokes of the brush, and the second one with vertical strokes. This produces a closer knit surface and insures a more uniform distribution of material. Mix this material only as requirements demand in case it is deemed economy to shop mix the stuff. A better working and, in fact, a more reliable filling up material is the result.

In the matter of cost there is not much to choose between the ready mixed and the shop mixed stuff. Where the material is mixed in the shop it is easier to gauge the composition of it to meet the requirements of the work. Moreover, there is the satisfaction of knowing exactly the composition of the material.

It is an error to suppose, as a large following of painters have apparently ventured to suppose, that the rubbing of the roughstuff will correct all the defects of surfacing due to either mistakes made in preparing the material or to carelessness in applying it. Brush marks wrought into the coats of stuff cannot be erased under the erosive effects of the rubbing stone. Hence the importance of keeping the surface free from brush marks.

Rubbing roughstuff is really a nice feature of the trade when all the things dependent upon it are considered. Not a few workmen persist in underestimat-

ing the importance of rubbing the foundation of roughstuff. The painter who can and will do a good, clean, and fine grade of rubbing stuff is entitled to a compliment.

Use water plentifully in rubbing. Take artificial rubbing stone furnished in blocks or bricks weighing something more than a pound per block, saw the blocks into required shapes and proportions, and, working with straight out and return strokes of the arm, avoiding circular strokes or motions, proceed to rub down the structure of pigment until the level and smooth surface, free from gouges and mars of any kind, is developed.

By using a generous supply of water the rubbing stone is kept from gumming up and clogging with the free substance of surfacing pigment. Keep the surface, in addition, well washed off so that the condition of the work may be noted at all times by the rubber. In connection with all these observations make note of the fact that upon the nature, and development, and rubbing of the surface of roughstuff, depends the admirable finish which automobile users are everywhere demanding.

SLIDING GEARS.

This Form of Transmission and How It Works, Fully Explained.

At the request of a reader who writes to ask for the information, the following is given concerning the sliding gear transmission: It consists of one or more gears which can be moved on one shaft and made to mesh with other gears on a shaft parallel to the shaft containing the movable gears.

The illustration will give a fair idea of the design of sliding gear transmission in use on many well-known cars at the present time. It consists of two movable gears A and B, which are moved along the main shaft by means of a yoke C C, worked by the lever placed at the right of the driver's seat. By moving this lever one notch forward, gear A is brought from the neutral position into mesh with gear D of the counter shaft J, giving the low or slow speed. Moving the lever forward another notch meshes gear B and gear E, giving the second or medium speed. To obtain the third or high speed the lever is thrown to the last notch forward which locks the two notched collars I, making the main shaft in direct drive from the clutch to the differential gears on the rear axle. To obtain the reverse the lever is thrown back to the last notch which meshes gears A and H, and H being in mesh with G, is driven by the motor through gear L and gear F.

The small gear, marked H, is placed on a short shaft under and between the main shaft and counter-shaft J. This short shaft is sometimes called the jack shaft and the gear it contains, the idle gear. The counter-shaft and the jack shaft are always running but do no work except when meshed with the gears on the main shaft K.

The object of the sliding gear transmission is to reduce the strain placed upon the crank-shaft and other parts of the motor in starting the car or when the motor is required to carry an unusually heavy load such as hill climbing.

To start a car having sliding gear transmission the motor should run slowly and while the clutch is disengaged, throw in the first speed gear, then speed the motor up to the maximum speed to be obtained on this gear; now throw out the clutch and with a quick move-

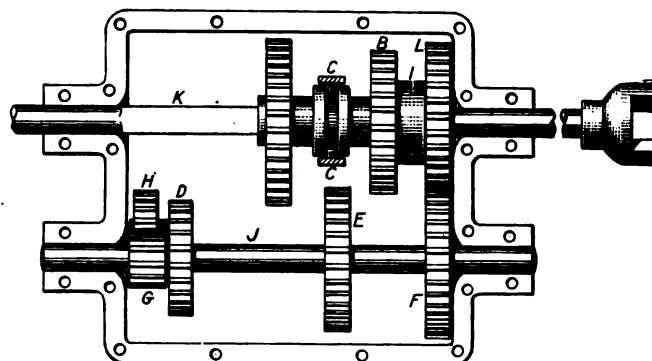
ment of the lever throw in the second speed gear and after motor is speeded up to the maximum second speed again throw out the clutch and then throw the lever over to the last notch which will lock the collars, I, as explained above and place the transmission in high speed.

To start the car and throw the lever quickly through first to high speed before the car has gained sufficient speed places an unnecessary strain upon the motor and may cause serious damage to the crank-shaft or main bearings.

The sliding gear transmission is one of simple design and easily kept in first-class order with proper care, but on the other hand if it is neglected it can quickly be destroyed.

Should the gears strip in this transmission the broken gear should be immediately removed and all pieces taken from the gear case as a broken tooth from a gear is liable to get between the other gears and destroy those also.

Heavy oil only should be used in a sliding gear



Selective Sliding Gear at High Speed

transmission as grease will not work into the bearings, and before grease can melt to a liquid form the bearings will become hot and cut so badly that they will have to be renewed.

No lost motion should be allowed in the gear shift levers as this may allow the gears to shift while climbing a hill, or when the car is standing with gears in neutral the lost motion may be enough to allow the gears to mesh and start the car.

Look Out for Strange Noises.

Sometimes the ear is deceived. That is to say, there may seem to be a slight unusual sound in the engine or some other part of the car, and yet it may be running all right. No car ever built makes exactly the same sound after it has been running for a time that it did when first put on the road. And yet it is not well to disregard the ear, for in four cases out of five, when an unusual sound is heard, it means something. For instance, a continuous clicking, wheezing or squeaking noise in an engine cylinder is generally a sign of loose or worn piston rings. It is important to attend to this at once, as neglect may result in scoring the cylinder walls. A puffing or cracking noise indicates that the compressed gas is escaping into the air, and the leakage may be generally found to be caused by a leaky compression cock or sparking plug. If valve grinding has not been attended to, the leak may be in the valves, which have become warped or pitted, and do not properly seat themselves. If the gears are out of true, they grind and the sound is variable and unsteady. Rattling generally indicates that something is loose or worn. So keep the ears wide open.

TROUBLE DEPARTMENT.

Questions answered by the Y. M. C. A. Automobile School, 323 West 57th St., New York.

This department is intended to be a "trouble clearing house," and it will be esteemed a favor if our readers will add information to it from their own experience or knowledge.

A Cylinder Misses.

Question:—My car is a Ford (Model N) and it has been giving no trouble at all since I cleaned the carbon out of the cylinder as you suggested, doing it about once every six weeks (without taking off the cylinder, though). Since the weather has gotten cool, one cylinder (the front) has persisted in missing occasionally, more especially when starting out. One valve, seemingly in the rear, makes a decided smack, louder than the others, and in cranking the engine with battery off (no explosion) gasoline is thrown out of the carburetor, the exhaust sounds as if one cylinder was working harder than the rest, always. I have tried every adjustment of carburetor, have changed plug in missing cylinder, cleaned vibrator points and commutator. The valves were ground last spring. Do they need it again and can an unexperienced man do it successfully? At the auto shops all kinds of prices are charged and I try to do all the repairing possible myself. As a proof of the saving in this plan, I will say I repaired a broken steering post at a blacksmith shop for fifty cents by inserting a pipe inside the post, making a good job. Was told by an auto repairman the job would cost about three dollars.

If any of your readers have used "Woodworth" or other treads with absolute success, I would like to hear from them through your columns.

Answer:—If the vibrator points are clean and smooth and the rotar surely makes good contact on all four points of the commutator, your trouble very likely lies in the valves needing grinding in. A leaky valve in one cylinder would cause loss of compression, which would mean slower combustion of the gas and instead of the pressure being greatly decreased before the exhaust valve is opened, it will remain high and make a louder report than the other cylinders, and while this would seem to indicate that this cylinder is doing more work than the others, in reality it is doing less.

Whenever it is found necessary to remove carbon from the cylinders it is usually necessary to grind in the exhaust valves. The inlet valves do not need so much attention. You should be able to successfully grind in the valves if the following instructions are carefully followed:

Remove the covers from over the valves, remove all valve springs and scrape all carbon from the top of and around the valves. Procure some flour emery and mix with cylinder oil to form a thin paste (there are good valve grinding compounds on the market that if procurable will take the place of emery and oil and give less trouble in mixing). Remove one valve from the cylinder and apply a small quantity of the grinding compound to the beveled seat (the part which touches the cylinder when the valve is closed). Replace valve in cylinder. In the top of the valve will be found two holes; insert the regular Ford valve grinding tool in these and rotate the valve back and forth about a quarter turn each way on its seat using very little pressure. Lift the valve occasionally and rotate about a half turn and then return to its seat and continue as before. Take out valve occasionally, wipe off compound and examine it; if not satisfactory add more compound and repeat grinding process until the valve

itself and its seat in the cylinder show a clean white band with no dark pits in them. Repeat operation with other valves, being careful that the valve push rods do not hold valve from its seat while grinding. Examine the valve stems and the guides in which they work and remove any gummy oil that might have collected on them. This will probably remove the tap you speak of.

Trouble In Starting.

Question:—I have for several years run a single cylinder Cadillac. It has given me the best of service at a minimum cost. I have been able to overcome most of the little difficulties incident to autoing, but there is one thing which bothers me. I have no trouble in starting the engine in warm weather, but as soon as the air is chilly and especially in freezing weather, I have great difficulty in starting. I carry a good hot spark and plenty of gasoline. What is the trouble and how may I overcome it?

Answer:—Your trouble no doubt lies in faulty carburization. Gasoline automobiles for cold weather should have some provision for heating the air used in forming the explosive mixture. This is often accomplished by making use of the heat of the exhaust from the muffler. The air intake pipe may be jacketed by a portion of the hot gases escaping from the muffler or the vaporizing chamber may be jacketed in the same way. After the carburetor does give a good mixture it may, under some conditions of cold, be condensed in the cold cylinder, and if the air happens to be warmer than the engine, moisture may be condensed upon the spark plugs and even affect the sparking. An engine which cannot be started on account of the cold can sometimes be made to operate by filling the water jacket with hot water and by pouring hot water over the carburetor, air inlet pipe and the mixture pipe or by laying cloths wrung out in hot water upon these parts. Some people make it a point to use the very light grade of gasoline in the winter, as the high test liquids evaporate freely at a considerably lower temperature. There is no difficulty in keeping a gasoline engine which is suitably supplied with warmed air in continuous operation at any winter temperature, after it is once started, and that there is no difficulty in starting an engine, no matter how cold it may be, if the procedure recommended be followed. In starting from a warm garage there is obviously no difficulty, and there should be no difficulty in starting after a stop of any reasonable duration in the open air, because it takes some time for the engine to cool.

Amount of Compression.

Question:—I have an excellent book on the construction and care of the automobile; among other things mentioned is a small pressure gauge to be applied to the hole of the spark plug in the cylinder, which when cranking slowly will indicate the amount of compression, but it does not state what the proper amount of compression should be in the different sized cylinders, nor where the pressure gauge can be obtained. Would be glad of any information you could give on the subject.

Answer:—Not knowing the type of car you are using, it is hard to say specifically what pressure or compression should be obtained, but should you get any pressure between 45 and 60 pounds per square inch, you should be satisfied. There could be no set rule for the indicated pressure of different sizes of cylinders for different manufacturers and even different

engines of the same manufacture would vary considerably. A pressure gauge suitable for this service can be obtained from any steam supply house, plumber's shop or such places, where gauges are used, and any kind of pressure gauge, either steam, water or air, would answer the purpose.

Putting On a Fiber Clutch.

Question:—Would like to have you tell me if there is a simple way of putting on a fiber clutch or brake lining and get the stuff on so it will be a true circle. You know it is quite stiff and when you go to bend it to fit the drum it will crack, and if it don't crack it will hump up. Is there no way to soak it in some solution so it will be soft and pliable without injuring the fiber?

Answer:—From personal experience the writer is unable to direct you in this matter but from a similar experience on some government work he found a very satisfactory method by placing the fiber in hot water and allowing it to stand for two or three hours, when it became very flexible and was very easily worked. However, the fiberoid used in this case was a special construction and what worked with it might not work with such material as you would get for the use of your automobile.

Depends Upon Circumstances.

Question:—Would like to ask you a few questions through your good paper. My son (15) would like to build a small automobile this winter (5x2½). Wants to use 18 or 22 inch bicycle wheels, belt drive, and a motor cycle engine 2¾ horsepower. Is engine strong enough to drive same only one speed forward and one reverse?

Answer:—It would be impossible for us to say whether your motor cycle engine of 2¾ horsepower would be capable of driving your proposed automobile, as it would be necessary for us to know the weight of the machine, the number of passengers you expect to carry and the size pulleys or gear ratio between your engine and the driving wheels.

Storage for Tires.

Question:—Would like to ask the best place to keep tires during the winter, whether to leave them on the machine and jack it up or whether to take them off and put them down cellar during the cold winter weather? I own an E. M. F. car and live in Iowa and we have lots of zero weather and sometimes far below, and I thought perhaps to take the tires off and put them in the cellar would be a good plan.

Answer:—It is advisable to remove the tires from an automobile when it is stored during the winter if it cannot be kept in a dark place. Removing the tires and placing them in the cellar in a good dark corner is very good storage.

Lubrication.

Question:—I note that in one of your late issues you recommend pure castor oil for a timer. As I understand it, castor oil, like some other oils, is inclined to gum. Would not 3 in 1 oil be a good oil for a timer?

What oil do you recommend for a Bosch magneto? Also advise if a timer should receive plenty of oil or not.

Answer:—On the general subject of lubrication we would say, do not experiment. Follow the brand and grade of oil as well as amount and frequency recommended by the manufacturer, who has probably done

a whole lot of experimenting for you. The reason why castor oil was recommended for timing gears is because non-fluid or some heavy oil is best suited for that purpose, and castor oil would not be likely to gum in such use.

For a magneto, use machine oil daily with an oil can for the drive, and dynamo oil in the ball bearings for about every 500 miles.

The timing gears should be oiled about once a month in the case of constant use.

Across the Continent.

Question:—I should like to know which is the best route from Boston, Mass., to California, and if it would be possible to make the trip in a 2,200-pound, 30 horsepower touring car. How many weeks would it probably take and what would the expense be including the tire bill? Could I make the trip on one set of tires? Would the roads still be in a fair condition after the first of November? Please answer by mail as I want to make arrangements at once if it would be reasonable to start so late in the season.

To this the following reply was made by mail: I see no reason whatever for your not being able to make a trip from Boston to California in a 2,200-pound 30 horsepower touring car.

It is hard to say how much time might be consumed in this trip as it would depend upon how fast you traveled and the time consumed in repairs should you of necessity have to engage in this unfortunate part of touring, and in like manner it would be impossible for us to state the expense for it would depend upon the time consumed, the hotels at which you put up, etc.

In regard to the tire question, there is no reason why you should not be able to make the entire distance on one set of tires, as it has been done by other people. But of course this depends upon the quality of the tires, the way you use them and something upon luck.

The roads should be in very good condition after the first of November. In regard to which is the best route I should advise that you purchase any good book on touring, with maps of the country giving the historical points and all other useful information for such trips. A good book for this purpose may be procured from Mr. Beck of the Automobile Club of America, whose address is 224 West 54th St., New York.

Faults of the Car of Today.

From S. L. Schoenfield, Ohio.—Your paper is a most excellent and practical exponent of the vagaries of the automobile. Cars, as they are built today, are far superior mechanically than they were, say only two years ago. One great factor is missing; that is, lack of proper provision for taking up wear on all mechanical moving parts. After a car has been driven 5,000 miles on an average, the question of taking up of wear begins, also the expense, and large at that, as cars are now being built. If at the start in designing the mechanical part of the car, the proper attention would be given wear, the first cost of the engines, etc., would not be materially increased by making such provision, but as it is lacking, the cost of operating an automobile in the right way is materially increased, owing to poor design or lack of thought.

Two other weak points in the cars of today: The steering apparatus is not strong enough, neither is there any provision made in case of accident to con-

trol the car. Last, but not least, a power pump to pump up tires should be a part of every motor.

I merely mention above, not for the purpose of appearing on paper, but rather that it may be the means of agitating these questions.

That Cylinder Trouble.

From C. S. Abbott, New Hampshire.—In relation to "A Cylinder Trouble" given on page 287 of your last issue, tell that man to look to his valve springs. I had the same trouble he describes—missing and blowing out through the carburetor for a time or two going up grade—with a Jackson '05, two-cylinder. The trouble is that the valve nut covers about a half-inch of the spring and the heat takes the temper out, the spring then not being stiff enough or snappy enough.

Lathes for Repair Work.

From H. F. Saylor & Son, Kansas.—We would like to have some practical readers tell us the size of lathe needed in an automobile repair shop. One large enough but not too large for repair work.

[Note.—We hope readers who have had experience will not only tell us the size of lathe which our correspondent ought to have, but perhaps give the name and address of manufacturers of suitable lathes for this purpose.—Editor.]

Acetylene Burners.

The majority of acetylene burners procure a flat, fan-shaped flame by employing two jets of gas impinging on each other at an angle. If the minute orifice from which the rear jet emerges become choked, there is nothing left to stay the front jet, and it may strike backwards and hit the reflector. If the reflector be a lens mirror the jet will crack it in a very few seconds, and these mirrors are very costly. It is, therefore better to use a flat jet burner, which cannot under any circumstances damage the reflector, and is also very economical of gas.

In Case of Skidding.

If the road is greasy, go slow and beware of getting into a tight place where the use of the brakes or quick steering is necessary, either of which may cause a skid. As soon as the car shows signs of skidding, de-clutch immediately. If this is done in time the car will probably right itself. The brakes should not be applied until the car has recovered a straight course. At the same time as you declutch the front of the car should be steered in the same direction as the back is sliding.

Care of Extra Tires.

Careful attention should be given to extra shoes and tubes, the latter in particular. When not in use they should be partly inflated and placed inside the spare shoes. Extra tubes should be spread upon a table with the valves spread half-way, and then rolled up, with the wires on top. Talcum or soapstone should then be freely sprinkled in the folds.

Some one asks why more kerosene internal combustion engines are not in more general use since their practicability has been demonstrated and it gives as much power as gasoline. There are at least two reasons for not using kerosene; one is that it is not so clean and is far inferior for starting purposes.

New Use for the Automobile.

C. Lombard Company of Waterville, Me., manufacturers of the famous Lombard log hauler, has made one of the most unique arrangements for a traveling circus that has ever been seen. It is a car for the use of the H. H. Linn dog show. A car 26 feet long and 6½ feet wide has been completed for the proprietor of the show, and is set over a gear similar to that which propels the hauler. By means of this car, which is fitted up into a comfortable traveling home, the carts containing the equipage of the show will be taken from place to place. A Brennan 4-cylinder gasoline engine of 50 horsepower propels the running gear, and the machine can travel over any kind of a road at the rate of four miles an hour. By means of a truck in front turned by a work gear, the car can be steered,



Car for the dog show.

and it can also be run in the winter time, by placing runners in front instead of the wheels.

The car is divided into two parts, the living quarters and the operating room. In the latter are repair kits, dynamos and all that is necessary for the mechanical part of the business. A dynamo capable of furnishing power for 150 sixteen candle power lights will supply the illumination for the car and also for the interior of the tent.

Mastic for Healing Tire Cuts.

Not long ago Mastic was mentioned in this magazine as a satisfactory substance for filling and cementing cuts in treads or other parts of tire covers, and for repairing punctures and holes in inner tubes. Since then we have had a good many inquiries as to where it could be purchased. In response to these letters of inquiry, it may be stated that it is manufactured by the Michelin Tire Company, of Milltown, N. J., and those who desire to know more about it can get all the necessary information by writing to the above address and mentioning this magazine. Cuts in tire treads caused by driving over crushed stone or broken glass, or otherwise, admit dirt and moisture. Dirt works in and under the tread, raises blisters and separates the rubber from the tire carcass. Moisture collecting, quickly attacks and rots the fabric. Disintegration follows rapidly once the fabric is affected. This decay can be prevented and the tire saved without the expense and bother of vulcanization, and if carefully and properly applied Mastic will be found extremely useful in the garage of the car owner.

Danger In Neglect.

There are some parts of the mechanism of a car that do not need oiling often, and yet to neglect them when they do need oiling is likely to result in a crippled car or perhaps an accident that will cost more than oiling or oil in a dozen years. After a bearing once becomes dry trouble comes quick.

It sometimes happens that a lack of lubricant at the dash bracket will cause an apparent binding of the steering gear. Sometimes dirt works into this bearing and causes the parts to cramp.

FRONT WHEELS.

If They Are Not Parallel They Quickly Wear Out the Tires.

Where a car has had hard usage or perhaps been in slight accidents the front wheels are apt to get out of true; they do not run parallel. Perhaps the steering pillar has been bent, or maybe the car has collided more or less heavily with some obstruction. At any rate, the wheels have got out of true, and their want of parallelism has had its effect on the tire covers.

If you think of it for a moment, you will see quite plainly that, if one of the front wheels is not running parallel to the line the car is taking, the tire will be travelling with a twist, and the wheel, while revolving, will, at the same time, be scraped over the ground. The friction will in the first place impede the running of the car, and in the second will wear out the tire. A tire is made to be rolled over the ground, not to be dragged over it. To give you an idea of the rapidity with which a tire can be worn out, under the influence of non-parallel wheels, it is sufficient to mention that a wheel with a deviation, from the parallel, of no more than $\frac{3}{4}$ -inch at the extremity of the spokes, can wear out covers completely in a journey of less than 400 miles.

The tread will wear regularly all round the wheel, and the trouble may go on undetected for a long time. This is especially the case with plain covers. The tread diminishes in thickness so evenly that no indication of what has been happening will be given until the canvas is suddenly laid bare.

See whether there is not too much play in the steering, and then ascertain whether the front wheels are running straight. If they are not, they can be brought parallel by heating and bending one of the coupling levers.

Many cars, however, have both ends of the connecting rod threaded. The length of the rod can thus be regulated perfectly, and the operation is very simple.

Another cause of non-parallelism of the front wheels is the play at the ends of the coupling rods. The forward movement of the car has, of course, a tendency to throw the fronts of the wheels apart, and the remedy is to rebush the articulations. As soon as this has been done, lubricate thoroughly, and especially the springs which act on the ball joints at the ends of the coupling levers. If these springs are well greased it is unlikely that they will break.

Tires also suffer from the displacement of the front axle, which must be taken into consideration. The front axle not being parallel with the back, the tires on the front wheels are compelled to run in a vertical plane, different from the usual running plane.

The rupture of the headed bolt, which is in the center of the spring between the two fixing collars, will often bring about this displacement. It is this bolt which holds the axle in position, and a comparatively slight jar is often enough to break it. A new bolt in place of the broken one will put the matter quite to rights. The car itself will generally give some indication as to what has happened; it will pull to one side unless a tight hold is kept on the steering wheel. If only one tire shows signs of wear, it is because the end of the axle is out of true. It will be necessary to remove and readjust the faulty part, which is a somewhat delicate operation.

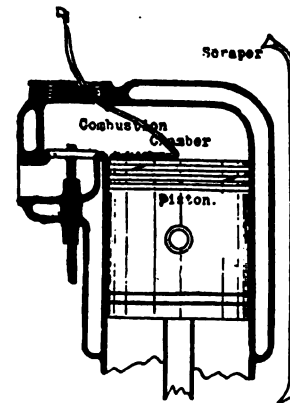
Sometimes the tread becomes abnormally worn on the side nearer the car. This happens when the

wheels, above the axles, lean towards each other at the top, which is generally caused by a bend either in the body of the axle or at its extremities. Sometimes it will be noticed that the front wheels, below the axles, lean towards each other. This displacement is usually the result of repeated bumps; for instance, the driver may not approach the curb with sufficient care.

But, from whatever cause the irregularity arises, the tires are sure to be affected. We may say that some car manufacturers set the fronts of the steering wheels at a very slight angle to each other; each wheel is not more than $\frac{1}{8}$ -inch out of the parallel. The difference is so small that it can do the tires no harm, and no correction is necessary. On the other hand, the fronts of the steering wheels must never be set wider than parallel, no matter how little the difference may be.

Effect and Removal of Carbon.

It often happens that the loss of efficiency of the engine or its noisy running is due to carbon deposit in the combustion chamber and on top of the piston. On the piston heads, and often in other parts of the compression space, especially if rough surfaces or irregularities exist in the casting, this deposit may cause pre-



For scraping cylinders.

mature ignition. Such accumulations may be removed by the use of long scrapers, operated through any sufficiently large opening, such as would be obtained by the removal of a valve cage, plug or valve cap. The illustration showing the scraper may make the process plainer. These scrapers are made of one-quarter inch or five-sixteenths inch soft steel, with the ends flattened in the forge and bent hoe shape, after which the edge is sharpened by grinding. By suitably bending the shanks and by turning the crank to bring the piston in an accessible position, it is possible to hold the carbon and withdraw it. A mixture of kerosene and commercial acetone will soften the carbon. A small battery lamp and a flat dentist's mirror will enable one to inspect the entire interior of the combustion chamber. The material detached may be scooped out clean or blown out with an air blast.

A Safety Automobile Crank.

A French association for the prevention of accidents has offered a prize of \$300 for a crank or safety device for automobile motors which shall automatically throw out of gear the driving action when not required. The invention of course is to remain the property of the inventor.

The taking of turns improperly by many drivers is the cause of many breakages of wheels and springs.

SECOND HAND CARS.

More Points to Be Noted In Making a Selection for Purchase.

Great care and discretion are necessary in buying a car, and it must be understood that the hints and suggestions contained in this article do not apply to any other than well-known reliable cars. Undoubtedly the best method is to engage the services of a properly qualified expert, but in all cases this is not possible. Hence it is necessary for the prospective buyer to have some idea as to where to look for faults.

In the first place, it is most important that the age and make of the car should be known, and if the makers are still in business; much delay and expense are often occasioned by neglecting to ascertain this. In the case of a part wearing, a special examination should be made to learn its full extent. Again, it is well to ascertain its actual as well as indicated power. It is therefore a good plan to have a cylinder taken off, and its bore and the stroke of the piston measured; the number of the revolutions of the engine can be taken, after being put together again. Consult some engineering expert for an idea as to the actual as well as the rated power. The condition of the paint work is not so important. This depends upon how the car has been used as well as how long it has been used and how long since it was repainted, if at all.

The car should run smoothly, without any knock, but it must not be forgotten that a smart mechanic can "tune up" a car so it will run well temporarily on smooth roads but will soon get out of order on rough roads or hills. If much knocking is noticed, it is certain that there is something wrong. The engine should rapidly increase its speed when the ignition is advanced, and should slow down immediately the spark lever is retarded. It is also advisable to note how slow the engine can be run, this being somewhat of an index as to its condition.

As to the ignition all the mechanism and wiring should be carefully examined. Note the size and appearance of the spark. If accumulator ignition is used, the cells must be minutely examined; if they appear to have a muddy interior and patchy plates, it is evidence of a bad condition, and when once this stage is reached, it is difficult to place any reliance on their capacity of retaining a charge. If a magneto is fitted, it should be examined for wear, as it often happens that the revolving portion is very slack in its bearings. The condition of the insulated wire need not be considered, it being an easy matter to renew.

All the levers, pedals, etc., should be tried in order to see if they operate, special attention being given to the brake levers. These should be tested as to their efficiency.

After all the parts have been inspected, a run of some 30 miles should be taken over a fairly rough road with several stiff grades. In making this demonstration the car should either have all its seats occupied or weight of some kind should be taken on to make up the deficiency.

The gears should operate smoothly and with very little noise; the reverse gear should be tried, as well as the holding power of the brakes. At the conclusion of the run the hand should be placed on the wheel bearings, and also on the gear box in order to feel their temperature; if fairly cool, it shows that they are in a fair condition and that they are well lubricated.

Finally, it must be remembered that the good condition of the mechanism (and not the outside appearance) is the important feature.

Cleaning a Carburetor Jet.

Almost every car driver is familiar with the recipe for clearing a blocked jet, which in nine cases out of ten is successful. We mean the holding out of the clutch and the racing of the engine for a few seconds, so as to put a strong suction upon the jet, thereby removing the obstruction. This, of course, can only be employed when some gasoline comes through, so that the engine can be run, for very often a partial stoppage, which is quite sufficient to prevent the car pulling properly, will not be serious enough to prevent the engine being run light. While this little dodge is so well known, there is a natural development of it which many forget. The object of the engine racing is to place a strong suction on the jet, and in all carburetors which have extra air inlets, either automatic or hand controlled, it should be borne in mind that these inlets should be closed, as then the suction on the jet is strengthened. No hard and fast rules can be given, because the designs and details of carburetors vary so much, but the principle will be grasped if we say that with a carburetor which has an automatic air inlet—in other words, a spring extra air valve—the engine should be run with the valve in its normal condition, but directly the engine has begun to race the valve should be held shut. The mere shutting of it when the engine is going fast puts a tremendous suction on the jet, and will probably bring out the obstruction. Of course, in some cases the only way to clean out the jet is to take down the carburetor.

The Steering Gear.

Do not run any longer than possible after anything indicates that the steering gear is out of order. Imperfect steering has caused many bad accidents. As soon as it is perceived that greater exertion than usual is required to steer the car—a thing which it is easy to detect—an early opportunity should be taken to ascertain what is wrong. The front of the car should be jacked up under the axle so that both wheels are free from contact with the ground, and then the steering wheel should be turned to the full extent in both directions. When the wheels are freed from the ground there should be put very little resistance to swinging them over to either lock by turning the steering wheel; in fact, in a first class car it should then be possible to spin the wheel a little by giving a vigorous tug at it. In case it is found that there is a stiffness somewhere when tried as described, it will be as well to have the entire steering mechanism looked into at once.

Treatment for Rims.

That the rim of the wheel is a very important consideration is fully understood when a tire blows out and you have to work hours to remove the old tire which is rusted solidly to the rim.

Running through gravel, sand or rough road will chip the paint from the outside of the rim and unless this is replaced the steel will rust and discolor the tire. Many prefer to paint or shellac the inside of the rim next to the tire. This is better than nothing but only special grades of paint will adhere to the steel and what paint to use is not always known to all.

The best treatment which can be applied to the inside of the rim is to coat it with a heavy coating of common stove polish and polish the rim as you would a stove. If this is done properly each time a tire is removed the tires will slip on and off the rim easily and the face of the rubber against the rim will be kept in good condition.

Frequent Inspection Needed.

Cars fitted with pressure-feed on the gasoline, the piping should be frequently inspected, on account of the danger from leakage. This should be done when the motor is stopped and the pressure still turned on. The tank should be gone over for leaks arising through fractures of seams from vibration, or the loosening of the union connecting the fuel lead with the tank. The lead and its connection to the carburetor should also be examined for leaks and abrasions due to rubbing against other parts of the mechanism. Twine, tire tape or rubber bands may be used as fenders to prevent further mischief. Unions which can not be made tight by screwing up should be taken apart and the male connections coated with soap or red lead,

which will render them tight until new ones can be procured.

Wear of Tires.

Tire manufacturers, as a class, are honest with their customers. If a tire can be repaired and give so many hundred miles additional riding, it speaks well for the manufacturer's product, and he is glad to be able to do it. When a manufacturer advises against it, however, it is best plan to take his word and buy a new shoe. During the past two years a motorist from Orange, N. J., has had two rear casings recovered three times, and has had more than 13,000 miles out of each of them. He knows how to keep his tires inflated properly.

THE CHECKERED TREAD.

At the Atlanta Automobile show the Empire Tire Co. will exhibit, for the first time, a new type of tread, which they call their checkered tread. This tire is the same heavy moulded construction that the firm has used this year, with such

CLEVELAND TWIST DRILLS.—On another page of this issue will be found the advertisement of the Cleveland Twist Drill Co. To dealers and the expert repairmen it is not necessary to call attention to the quality of the drills, reamers, taps, etc., manufactured by this company as there is



Empire Checkered Tread.

excellent results. The Checkered tread will be one of the best non-skidding devices ever offered to the tire trade, and cannot fail to be popular.

WE UNDERSTAND that the Turner Brass Company has obtained a temporary injunction against the Vanguard Mfg. Co., for alleged infringement of a patent on a certain style of automobile bumper. The Vanguard Co. has issued a statement in which they say that the manufacture of the style of bumper claimed to be an infringement has long since been discontinued for the reason that they have been found to be unsatisfactory in actual service. They are now engaged in perfecting a new and superior type of bumper, which they say will soon be placed on the market. They say further that the injunction obtained against them will be contested in the courts in order to establish the fact that the Vanguard Company have not and are not infringing on any patents whatsoever.

KEEP WARM WHILE MOTORING.—One serious drawback to motoring in the winter, especially in severe weather is that one gets chilled and the feet especially are liable to get very cold. The Chicago Flexible Shaft Co., 154 La Salle St., Chicago, Ill., is manufacturing an automobile heater which sells at a reasonable price and will keep you warm while riding. The device is compact and convenient. There is no flame, no smoke, nor smell, but just a nice pleasant heat. Write them for descriptive circular and price and mention THE AUTOMOBILE DEALER AND REPAIRER.

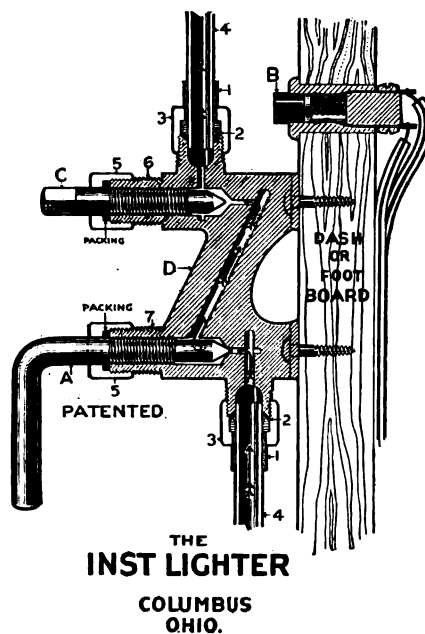
no part of the world where first-class machine shops exist that you will not find their tools. To those who have not used these tools we ask you to try them and if you find them superior to those you have been using write and tell the company who told you to use them. The best is always the cheapest.

THE INST LIGHTER.

The Inst Lighter with its positive gas control is a device which in the last year has come into extensive use for lighting the gas lamps on automobiles. It lights the headlights while the car is standing, or while it is traveling at any speed. The gas from the gas tank is piped to the gas controller shown in accompanying illustration. This controller is screwed fast where it can be easily reached, on the dash or under the driver's seat on the foot board. A pipe then leads from the gas controller down to the ordinary piping and hose connections with which the car is already equipped. These in turn lead to the two headlights. The needle C, (which can be adjusted with a gas tank key when necessary) is set to allow the gas to flow to the lamps at the proper pressure to give the best light. The needle A, has a permanent handle and is used to turn the gas on and to shut it off. The main feature in the operation of the gas controller is that the needle C, which adjusts the height of the flame in the lamps, remains fixed and is not disturbed in turning on or off the lights. Another feature is that in turning on the gas with needle A, no care need be taken to turn the handle to

any certain point. It is only necessary to open it a part of a turn, needle C provides the necessary adjustment. A third feature is that the needle valve A, can be used for lowering the lights below the ordinary height while driving in parts of cities where bright lights are not permitted. Upon leaving such districts it can be opened again, causing the needle C to resume its work of keeping the gas at its most efficient height. This gas controller is patented and its perfection after a number of expensive experiments makes the lighting of the lamps by means of an electric spark at the burner, not only possible but perfectly safe and extremely satisfactory.

The spark which lights the lights is controlled by a push button mounted beside the gas controller. To light the headlights, turn gas on with needle A and touch button B. That is all. A special coil is



furnished which can be mounted in the battery box or under one of the seats. Special wire of two kinds and clips for the spark gaps at the burner, together with pipe, conduit, screws and instructions constitute an Inst Lighter outfit. The installing of an Inst Lighter is quite simple.

By manufacturing on a larger scale than was possible at first, The Inst Lighter Company have been able to reduce the price on the complete outfit and particulars will be given by addressing The Inst Lighter Co., Columbus, Ohio, mentioning this journal.

GRAND CENTRAL PALACE SHOW.—With the 10th annual automobile show, which opens New Year's eve in Grand Central Palace, New York, under the management of the American Motor Car Manufacturers' Association will be associated the Importers' Automobile Salon, making this show the only international affair of its kind in America. The imported cars will be, as was the case last winter, exhibited on the main floor together with those of the manufacturers holding membership in the A. M. C. M. A. Alfred Reeves, general manager of the A. M. C. M. A., will again have supervision of the exhibit. The show committee has announced that the scheme of decoration will transform the hall into a trellis garden. It involves a lattice and landscape effect with hosts of electric lights and immense fire balls to bring out the pictorial scene and floral designs. A porte cochere will be erected outside the building, as last year, but the design will be changed and it is to be in keeping with the interior decorations.

French glass mirrors will be erected at the back of the main hall and in front of these will be placed an electric fountain. The garden effect will be carried out consistently, even to the furniture used in the exhibitors' booths.

To insure uniformity, decorations and signs for all exhibition spaces must be secured from the official decorators and no other decorations or signs will be allowed. These decorations will consist of suitable floor coverings with mouldings, signs, background coverings, draperies, etc., where required, all textile fabrics being fireproofed.

Exhibits will be received at the Grand Central Palace, 43d street entrance, on and after Dec. 29, 1909.

DOW PERFECTED MAGNETO.—In this issue for the first time, appears a half page announcement of the Dow perfected magneto made by the Dow Mfg. Co., Braintree, Mass. This magneto has been designed especially for "The man who drives his own car and for the chauffeur who is his own mechanic." This company challenges comparison and comparative tests. They say there are no sooty cylinders, no fouled plugs, no sticky, pitted valves. The Dow perfected magneto keeps the motor clean. One-fourth turn of crank starts the motor. Your car with this magneto can be throttled down to four miles an hour. The adjustment is extremely simple and can be made without wrenches, screw drivers or any other tools. It is claimed by the manufacturers that the power of the engine will be doubled, and the result of the driver's work trebled by the perfection of ignition which this magneto gives. But see their advertisement on another page. They cannot tell you all about it even in the advertisement. They want to send you a booklet giving other reasons for the remarkable claims they make for this magneto. Write for it and mention THE AUTOMOBILE DEALER AND REPAIRER.

TO DEALERS.—The American Lava Corporation, Chattanooga, Tenn., has a full page announcement in this issue, especially addressed to dealers. They want to send you a sample, free, and quote you their special dealers' rates. They say that they shipped over 87,000 Alco Burners in September alone. In writing mention THE AUTOMOBILE DEALER AND REPAIRER.

G-R AIR PUMP.—In this issue will be found the announcement of the Gardner-Rix Gov. Co., Quincy, Ill. They say that every garage should be equipped with one of their pumps, and they want to send a descriptive circular with prices to every reader interested.

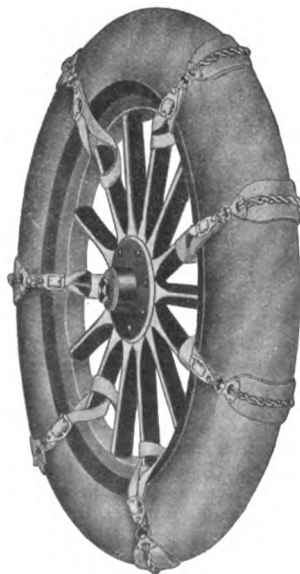
IMPROVED WOODWORTH TREADS.

Constant improvements in forms and materials each year have marked the Woodworth tire treads, made by the Leather Tire Goods Co., of Niagara Falls, N. Y., and for the coming season the method of holding the tread on the tire differs considerably from that employed



Woodworth Self-Adjusting Tread.

in the past. Along each side of the tread a number of galvanized steel plates are rivetted a short distance apart, and these, as shown by the accompanying illustration, are connected by short and very stiff springs. Each spring is linked to one end of a plate and has a hook on the other end. The tread is applied by slipping it side-wise over the deflated tire with the springs



Woodworth Single Chain.

unhooked. After the tread is in place the springs are hooked up, connecting the plates and forming a continuous fastening on each side. As the tire fills out the springs are stretched, holding the cover tightly on the tire. The improved "self adjusting" treads are made of leather, treated by a new process which is claimed to increase greatly the life of the leather and to prevent dirt and water from affecting it. The leather is of a very dark green color. The rivets used in the center of the tread have thicker heads than formerly and have rounded corners, while the sides

of the tread have flat head rivets to protect the leather from being torn when in ruts or rocky roads.

TO GARAGE OWNERS.—The attention of garage owners and repair men is directed to the announcement in this issue of the Prest-O-Lite Co., 251 East South St., Indianapolis, Ind. They say there is good money in offering to clean all the carbon out of an engine for from \$3 to \$5, which can be done with the "Prest-O-Lite Carbon Remover." But consult their announcement on another page and write them for further particulars mentioning THE AUTOMOBILE DEALER AND REPAIRER.

M. & M. REPAIR OUTFIT.—The M. & M. Mfg. Co. of Akron, Ohio, have an announcement in this issue, which will interest a great many readers, because it refers to their repair outfit. If there is one thing more exasperating than another when a car breaks down or refuses to move, it is to find on investigation, that some certain tool you need is missing. Get a regular outfit and then you will have all the tools you need. Dealers and jobbers everywhere sell these outfits, or you can communicate direct with the company. In writing them for catalogue and price list, kindly mention THE AUTOMOBILE DEALER AND REPAIRER.

MODEL ADJUSTABLE VULCANIZERS.—In this issue the Auto Tire Vulcanizing Co. of Lowell, Mass., have a new announcement, which most of our readers will be interested in. But consult their advertisement and write to them for Catalogue and discounts and mention THE AUTOMOBILE DEALER AND REPAIRER.

"BAD ROADS DON'T MATTER."—The Cartercar Co., of Pontiac, Mich., in an announcement in this issue say that when their car is used "bad roads don't matter." They claim that the mechanism of this car is so simple that it is practically impossible to injure it. They also say that a boy can learn to care for and drive one of their cars in a short time. But consult their advertisement and write for further particulars mentioning THE AUTOMOBILE DEALER AND REPAIRER.

BRENNAN MOTORS.—The Brennan Motor Mfg. Co., of Syracuse, N. Y., say they challenge comparison with other motors. They claim that their motors run quietly and smoothly giving efficient and reliable power. They would like to send their catalogue and price list to any reader who may be interested enough to write for it and mention THE AUTOMOBILE DEALER AND REPAIRER.

THE GARDNER TRUSS FOR "FORD."—In this issue will be found a new announcement of the Gardner Engine Starter Co. 1451 Michigan Ave., Chicago, Ill., manufacturers of the Truss for Ford "T" rear axles. They say these will save big repair bills and a lot of grease. They can be instantly attached and keep the grease in and the dirt out. But consult their announcement and if interested in writing to them, mention THE AUTOMOBILE DEALER AND REPAIRER.

THE COLUMBIA LOCK NUT.—On another page will be found the advertisement of The Columbia Lock Nut Co. This device is not a nut lock but is a lock-nut as will be noted on examining the cuts. That this lock-nut will do all that is claimed for it is an actual fact which has been shown by its adoption in all lines of mechanical work where an absolutely reliable lock-nut is required. All our readers who expect to visit the automobile shows at Grand Central Palace and Madison Square Garden, New York, are requested to visit the exhibit of this company.



Lubrication Costs Less Than Repairs

Most of the bills for automobile repairs are really the costs of faulty lubrication in disguise. The grade of Vacuum MOBILOIL specially prepared for your particular car will give perfect lubrication and save time, trouble and money.

VACUUM MOBILOIL

is made in six different grades. One of these is the right grade for you. The requirements of your car have been exactly determined, and this grade of MOBILOIL prepared for it with scientific precision.

Send or booklet listing every automobile made and the grade of MOBILOIL prepared for it. Thereafter you need only watch the label on the can; the car will take care of itself. The book is free; its facts on the science of lubrication are invaluable. Gives track records to date, and other potent motor pointers.

MOBILOIL, in barrels and in cans with patent pouring spout, is sold by dealers everywhere. Manufactured by

VACUUM OIL CO., Rochester, N. Y.



Make a Hit with Your Customer

Garages everywhere are putting out signs, offering to clean all the carbon out of an engine for \$3 to \$5.

There's good money in it, because it takes so little labor and time, with

PREST-O-CARBON REMOVER

Your customer could use it at home, but he'd rather hire the job done, if the price is right. Make it easy for him, and he will have his engine cleaned often.

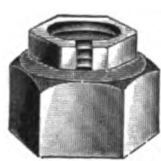
The day of tearing down and scraping engines, is closing. The new and better way has arrived. Get in and get your share.

Order some of this liquid, and write us for full information. Retail prices: Gal., \$3.75; Half Gal., \$2; Quart, \$1. In cans. Guaranteed.

The Prest-O-Lite Co., 251 East South St., Indianapolis, Ind.

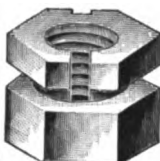
Branches at New York, Boston, Philadelphia, Cleveland, Minneapolis, Omaha, Dallas, Los Angeles, and San Francisco.

A NECESSITY ON AUTOMOBILES!!!



ORIGINAL.

What?



IMPROVED.

COLUMBIA LOCK NUTS.

They Will Not Shake Loose.

A LOCK NUT, NOT A NUT LOCK.

Let us send you one without charge to fit that bolt you had trouble with yesterday.

What Size Was It ???

Our "Green and Yellow" booklet tells "WHY" nuts shake from bolts.

What a comfort to ride in a car when you are sure every nut is tight on frame, engine and steering gear.

Try us and tell your friends.

**COLUMBIA NUT AND BOLT CO., Inc.,
BRIDGEPORT, CONN.**

Rubberlife

A Tire Preservative

Apply Rubberlife to the tires of your car (Rubberlife is a liquid and you can do it yourself with little effort) and you will notice that your tires have become lively and resilient.

So, as days go by, you will further notice that your tires are in better shape than ever before and that your car is running smoother than ever—your softened tires are acting as real shock absorbers probably for the first time.

Apply Rubberlife again, and again, at intervals of from a week to ten days for a year or more. Then—

Count Your Tire Saving

and you will find that Rubberlife has cut down the upkeep of your machine considerably—practically doubling the life of your tires.

Rubberlife is sold for \$7.50 per gallon and \$4 a half gallon. One gallon is sufficient for four tires for a year if care is used.

We positively guarantee Rubberlife will not injure any tire.

Write for our book "Rubberlife Brings Tire Economy and Comfort."

**RUBBERLIFE SELLING COMPANY,
840 Real Estate Trust Bldg.,
Philadelphia, Pa.**



To Garage Owners and Dealers LORD'S LUMINO

"The King of Brass Polishes"

LUMINO is a white creamy liquid and will not readily settle or harden in the can. It is positively **guaranteed** not to scratch the smoothest surface, and metals polished with it will hold their lustre for a long time.

To any **GARAGE OWNER** or **DEALER**, or **REPAIR MAN**, who will send his business card, or address on letter head or bill head, we will send a **Handsome Celluloid Souvenir Pen and Pencil Combined**, **FREE OF CHARGE**.

Write **at once** for special terms.

Address **F. T. LORD POLISH CO., 37 Hovey Ave., Cambridge, Mass.**

The Cooling Fan Blades.

The blades of the fans are usually riveted to a metal hub and they should be examined occasionally to see that they are securely fastened. The high speed at which they revolve may result in a blade working loose and in time flying off through the radiator or bonnet with accompanying disastrous effects.

Cost of One Race.

Automobile races come high but we must have them. At the Vanderbilt Cup race the entrance fee was \$500. Boxes in the front row of the grandstand sold for \$100, and in the second and third rows for \$75 and \$50. The front row boxes were disposed of about as soon as they were placed on sale and it cost the price of a month's rent—of common folk—to get a good seat anywhere on the course. Yet more than 200,000 people were there.



Pleased Plug Patrons

and a few reasons why we have so many of them.

BECAUSE—Our Plugs give the best of satisfaction.

BECAUSE—Our Plugs cost no more than others.

BECAUSE—Our porcelains are easily removed and cleaned if necessary.

BECAUSE—Our Plugs can have porcelains replaced and are good as new.

Special Prices and Catalog to Dealers on Request.

VANGUARD MFG. CO., Dept. Joliet, Ill.

POCKET METERS.

So wide-spread has the use of batteries become that the demand for small pocket meters with which to test them has grown to considerable proportions. The Hoyt Electrical Instrument Works of Penarock, N. H., early recognized the importance of



The Hoyt Pocket Meter.

this field, and have devoted a great deal of attention to it. Their latest being a line of ammeters and voltmeters approximately the size of a gentleman's No. 16 watch, the novel feature of which is a silver-plated metal scale which combines accuracy, durability and tastiness in design. Realizing that the first requisite was a careful standardization of every part, they claim to have designed every part

so carefully that exhaustive tests have failed to show any material error in any part of the scale. These meters are of the permanent magnet type, and every detail has been carefully looked after, even to the construction of the case which is substantially made in one piece to insure rigidity and mechanical accuracy. A novel design of lettering has been adopted for the dial to readily distinguish them from other meters of somewhat similar general appearance. The trade has taken very kindly to the instrument, and the letters received so far by the makers comment very favorably on them.

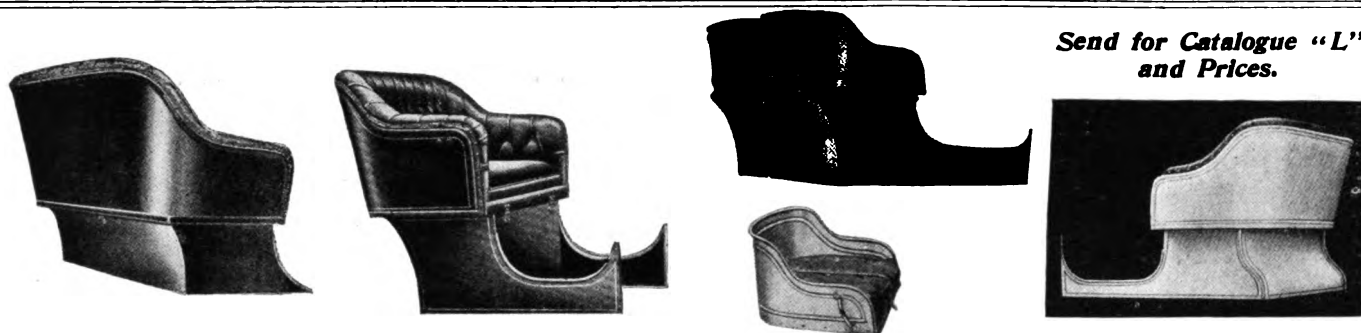
LORD'S LUMINO.—Garage owners, dealers and repair men should turn to the advertisement in this issue of the F. T. Lord Polish Co., 37 Hovey Ave., Cambridge, Mass., manufacturers of Lord's Lumino, which has achieved the reputation of being "The King of Brass Polishes." Its distinguishing characteristic is that it cleans quickly and gives a "luster that lasts." It is efficient as a cleaner of brass, nickel, copper and other heavy metals. It comes in the form of a white creamy liquid, requires little shaking, and will not settle readily or harden in the can. It is positively guaranteed not to scratch the smoothest surface. To introduce it quickly to the attention of all not already using

it, a beautiful celluloid souvenir pen and pencil combined will be sent free of charge to any dealer, garage owner or repair man, who will send his business card, or his address on his letter head or bill head. This company wants to place this polish in the hands of the people referred to throughout the United States, and invites them to write at once for special terms and further particulars. In doing so, kindly mention **THE AUTOMOBILE DEALER AND REPAIRER**.

THE "HANDY" SEVERABLE BATTERY REPAIR PLATE.—Repair men are requested to consult the advertisement in this issue of the Electric Maintenance & Repair Co., Sunday Call Building, Newark, N. J., which gives some particulars with respect to their "Handy" Severable Battery Repair Plate. They want to send a pamphlet giving full particulars with prices to every repair man in the country. Write them at once and mention **THE AUTOMOBILE DEALER AND REPAIRER**.

CIGARS BY THE BOX.—A Salomon & Son of Kalamazoo, Mich., have an announcement in our advertising department of cigars by the box, strictly hand made, of long fillers. They claim these cigars are equal to cigars selling at retail at twice the cost. Write them for catalogue and mention **THE AUTOMOBILE DEALER AND REPAIRER**.

Please mention the Automobile Dealer and Repairer when writing to advertisers.



Send for Catalogue "L"
and Prices.

SEATS = The Pictures tell the Story

We make 'em for ANY CAR, such as

Buick, Model 10
Ford, - any model
Maxwell, "any model"
Brush

Reo
Mitchell
Cadillac
E. M. F. 30

Hudson 20
Chalmers-Detroit
Studebaker-Flanders
De Tamble

Perry
Pope-Toledo
Jackson
Wayne

Hupmobile
Winton
Overland
and others

If you are the owner of a Ford Runabout, write us at once. We will present you with a NEW CAR for \$55.50.

AUTO REBUILDING CO., 1311 Wabash Ave., Chicago, Ill.

PYRAMID ALUMINUM FLOOR COVER

Makes an old car like new and gives class to a new one. The most durable, clean, attractive and economical floor cover for

Automobiles, Carriages and Motor Boats.

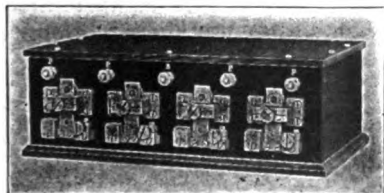
Furnished in sheets and cut and laid as easily as rubber or linoleum. Write for Circular F 31, which gives full description.

A source of profitable business during the winter rebuilding season. Live wires, get busy.

FACTORY SALES CORPORATION,

1436 Michigan Avenue,

Chicago, Ill.



SCHUG Electrical Specialties



Are the
World's Best
by Every Test.



SPECIAL PRICES TO THE TRADE.

WRITE TO-DAY FOR CATALOGUE.

SCHUG ELECTRIC MFG. CO., DETROIT, MICH., U. S. A. 326 E. JEFF,

SEATTLE MARINE SUPPLY CO., Seattle, Wash., Pacific Coast Agents.

Please mention the Automobile Dealer and Repairer when writing to advertisers.

The Whittaker are The Standard



Price and Quality Right

Dealers and Users Get a Square Deal

WHITTAKER CHAIN TREAD CO.,
2 PEARL ST., BOSTON, MASS.

JUST OUT!

WRITE for our new 24-page booklet, "USE AND CARE OF MAILING LISTS." If you are at a loss to plan your Fall advertising campaign, or if you are hesitating between magazine and direct advertising, this booklet will put you on the right track.

If you are at present using Mailing Lists, we may be able to give you some new ideas as to the expeditious and economical handling of them. The book is full of useful suggestions for the advertising manager. It also gives a synopsis of all the state registration laws.

We Make No Charge.

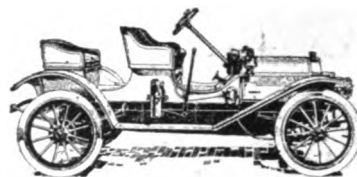
The book is free to the advertising manager. We only ask that you write us on your firm's stationery, as we have only a limited number of the books and we do not care to waste any copies.

Automobile Advertising Company,
422 State Life Bldg., Indianapolis, Ind.

We will be glad to instruct you as to the cost and how to install a card filing system, or to figure out the cost of a circularizing campaign.

Bad Roads Don't Matter If It's A

"The Car
Ahead"



**\$1,100
Completely
Equipped
Including
Magneto**

Cartercar

The Cartercar has but very few parts and is a wonderfully simple automobile.

It has a friction transmission and chain-in-oil drive.

This gives an unlimited number of speeds, and delivers the motor power to the rear wheels with very little loss.

For these reasons bad roads, hills, sand, etc., don't matter with the Cartercar.

A boy can learn to drive and care for a Cartercar in a short time.

Its mechanism is so simple, that it is practically impossible to injure it in operating.

The Model "H" as shown above is \$1,100; with double rumble seat \$1,125; with double divided rear seat \$1,150; with miniature tonneau \$1,150.

Magneto, gas lamps, generator, oil lamps, horn, tools, jack, etc., included in equipment.

Cartercar Company,
Pontiac, Mich.



Greater Speed

is possible with the
Underwood because
the

UNDERWOOD

STANDARD

TYPEWRITER

has a faster type bar action and a more perfect escapement movement than any other machine ever manufactured, evidenced by the fact that all championships are won on the Underwood.

Its free and easy key action and the instant response of the moving parts allow the operator to accomplish the work in less time and much easier. That is why most operators prefer the Underwood. Let us show you a few of its exclusive features and you will understand why we say it is

"The Machine You Will Eventually Buy"

THE UNDERWOOD TYPEWRITER CO., Inc.

Anywhere

Please mention the Automobile Dealer and Repairer when writing to advertisers.

WE WIN

TO PURCHASERS OF SUPPLEMENTARY SPIRAL SPRINGS.

"The Patent Office at Washington, D. C., on October 30, 1909, rendered Judgment in our favor against John Hector Graham in the Interference entitled Graham v. Furmidge, which involved an application for patent filed by John Hector Graham, December 19, 1907, and the Furmidge patent No. 807,612, which by assignment from Furmidge is owned by this company."

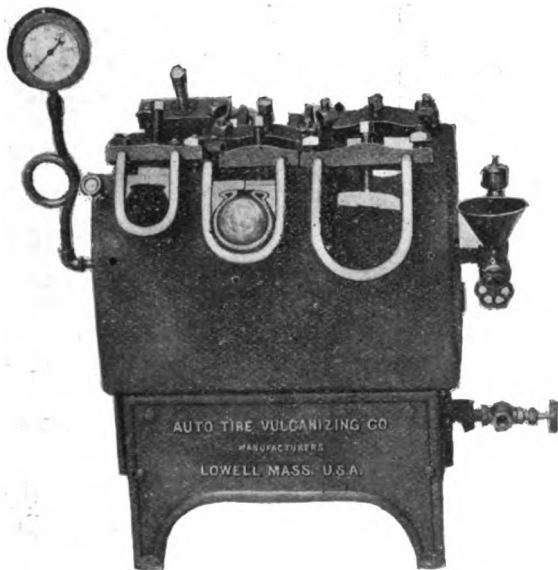
Why not get the genuine **St. Louis Supplementary Spiral Springs** instead of dangerous imitations?

Supplementary Spiral Spring Company

4524 Delmar Avenue, St. Louis, Mo.

New York Office, Room No. 202, Motor Mart Building,
1876 Broadway.

OUR NEW No. 7, 1910 MODEL ADJUSTABLE SECTIONAL VULCANIZER WITH THREE CAVITIES



"Capacity from 2 inch Motor Cycle to 4 1/2 inch Automobile tires. It has twelve pair of bead irons, thus insuring a perfect fit for all the various makes of tires, either Clincher, Dunlop or Goodyear style or Fisk mechanically fastened, also the Clincher type of motor cycle tire. This Vulcanizer is furnished with gas or gasoline burner or to connect direct to steam boiler. Our new 1910 Vulcanizer is cast in one piece and is steam jacketed like all our other vulcanizers. You cannot afford to be without our Three Cavity Adjustable Sectional Vulcanizer. It is a money maker and a money saver. Write for Catalogues and Discounts.

AUTO TIRE VULCANIZING CO., LOWELL, MASS., U.S.A.

THREE REASONS WHY YOU SHOULD USE

Reliance

(REG. U.S. PAT. OFF.)

SPARK PLUGS



"**Spark in Water**," which means they will spark in the cylinder under any and all conditions, for water is the worst of all short-circuiting matter. A drop of water will short-circuit other plugs, which proves they are inferior. Reliance is the one plug that is *recognized* as mechanically correct.



The "**Sparking Point**" is a hair-like platinum wire, baked into the porcelain insulator and being so small that the spark is concentrated and intensified to such a degree, that the heat and scouring action of the spark removes all fouling matter around that point. Soot accumulates on other plugs and necessitates *cleaning*. Cleaning entirely unnecessary with the Reliance Plug.



No Compression Leakage can take place past the central electrode, as the cylinder end presents a solid surface of porcelain. With this plug it is possible to utilize the entire energy of the battery and coil to produce maximum heat in the spark and secure perfect ignition.

Made in All Sizes, in Porcelain and Mica Backs.

JEFFERY-DEWITT CO.,

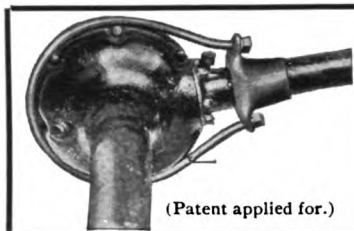
SPARK PLUG MANUFACTURERS,

231 High Street, Newark, N. J.

S. & F. Stephenson, Agents for United Kingdom,
19 Canning Place, Liverpool, Eng.

Armand Frey & Co., Agents for Continental Europe, Berlin, Germany

Please mention the Automobile Dealer and Repairer when writing to advertisers.



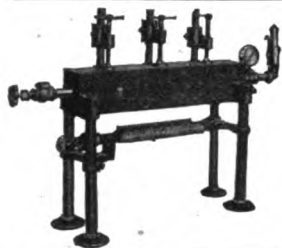
(Patent applied for.)

SOLD TO FORD—"T" OWNERS ONLY**THE GARDNER TRUSS FOR FORD—"T" REAR AXLES**

WILL SAVE SOME BIG REPAIR BILLS AND A LOT OF GREASE

This device will hold the three parts of rear axle and shaft housing as solid as if made of single piece of steel. Axle cannot rock and break off studs and flange. Instantly attached. Keeps the grease in and the dirt out. Note that groove in the loop. Remit with your order \$2.00. F. O. B. Chicago.

GARDNER ENGINE STARTER CO., 1451-1453-1455 Michigan Avenue, CHICAGO, ILL.

**The "Boilerless" Steam Vulcanizer**

Underneath the square semi-steel body is fitted our special gas burner, thus doing entirely away with boiler for inner tube work.

Gasoline burner and tank supplied instead of gas if desired.

Furnished complete with steam gauge, safety valve, filling valve, air cock, and our well-known quick acting clamps. LOW COST. HIGH SATISFACTION. Immediate shipment. Write us to-day.

WISHART-BURGE MACHINE WORKS,

64-66 SOUTH CANAL STREET, CHICAGO, ILL.

WANT ADVERTISEMENTS.

Under this head will be printed advertisements of shops for sale or to rent, or shops wanted, or situations or help wanted, or tools or machines (second-hand) wanted or to exchange, at the uniform price of two cents a word, which will include the address, for each insertion, payable in advance. No advertisement will be inserted for less than 30 cents, however small.

Remittances can be made in postage stamps if more convenient. Address,
MOTOR VEHICLE PUBLISHING CO.,
24 MURRAY STREET, NEW YORK.

COMMERCIAL MOTOR VEHICLES—Read the "Power Wagon" for reliable information concerning motor trucks, motor buses, motor cars and other machines employed for business purposes. Issued monthly; single copies, 10 cents; \$1 a year. The most valuable paper of its kind published. The Power Wagon, Metropolitan Block, Chicago.

TOPS—Until further notice, runabout tops \$20, touring car tops \$35. C. G. Meyer & Son, Tiffin, Ohio.

FOR SALE—Running gear with tires \$75.00; steering wheel \$10.00; sliding gear, transmission, new, \$50.00; pressed steel frame \$25.00; set of fine lamps and generator \$15.00; top and seat for runabout \$35.00; 10 H. P. engine \$35.00; four horse stationary engine \$50.00. Lathes and machinery. Central Supply Co., Richland, Pa.

FOR SALE—Automobile engine, 4 cylinder, air-cooled, Model G Knox. Apply to L. Schreiber & Sons Co., Cincinnati, Ohio.

A BARGAIN—Rebuilt 7 horse power runabout, \$150 if sold immediately. Box L, Wolf Creek, W. Va.

"STEAM, Steam, Steam, That's The Stuf"

All Steam Car Owners should subscribe for the "Steam Motor Journal" a 28 page illustrated monthly devoted exclusively to the interests of the steam propelled automobile. \$1.00 per year, sample copy 15 cents. Chas. D. Sherman, 212 Orchard Road, New Haven, Conn.

Build Your Own Cars.

We can furnish you with chassis parts, including engine, axles, transmission, frame, etc., at attractive prices. Write us for details.

John H. Blacker & Co., Chillicothe, Ohio.

ONE 1907 REO TOURING CAR—Top and detachable tonneau, solid tires, all in good shape; quick buyer's price, \$425. F. Herbst, Wilmington, N. C.

WANTED—Agents to sell our "Innershush" and "Shur-hold Patches" in every locality. Write for particulars. Address Inner Shoe Tire Co. Grand Rapids, Mich.

AUTO 1909 CASES AND TUBES, new, fresh from the factories.

Size	Case	Tube	Size	Case	Tube
28x2½	\$8.50	\$2.75	32x3½	\$18.00	\$4.25
28x3	11.55	3.10	32x4	23.10	4.95
28x3½	16.40	3.85	34x3½	19.25	4.50
30x3	12.00	3.30	34x4	24.85	5.30
30x3½	17.05	3.95	34x4½	30.80	7.40
30x4	21.80	4.40	34x5	42.25	8.50
31x4	23.25	4.40	31x4 fits 30x3½ rims.		

Also a few guaranteed cases 30x3 \$14.10. 30x3½, \$20.75; 32x3½, \$22.05. Single tube tires 28x2½, \$10; 28x3, \$12. Seconds \$2 less. I ship, pay for tires after examination. Prices subject to change without notice. Wm. Vanderpool, Springfield, O.

DO YOUR OWN BRAZING—Aluminum solder, cast iron brazing compound, formulas 50 cents each with complete instructions. Alexander, 193 So. Oxford St., Brooklyn, N. Y.

FOR SALE—Brush Runabout, new, in fine condition. Demonstration. Bargain. Address, Box 45, Hamburg, N. J.

FOR SALE OR TRADE—Parlor combination Billiard and Pool table, 16 balls, six cues. Adjustable rack for table. Write to O. A. Bierly, Bloomington, Ind.

FOR SALE—One runabout gear and body in A-1 order, shaft drive. Wheel steer, sliding gear, two ahead one reverse, 26x2½ tire, four Ex. innertubes, horn, two lamps, four new 26x3 Dunlap Midgley Tread casing, just the car to install a choice of motor. Price \$140.00. One new Kingston single coil, \$3.50. One Turner carburettor, new, \$5.00. One Pedersen force feed oiler, new (5 feeds) \$18.00. One W. & S. Magneto, new, cost \$33.90, at \$32.00. Address David J. Brown, Agt. and Dealer, Liebhardt, N. Y.

FOR SALE CHEAP—One Ever Ready tire tool (new), one Little Wonder vulcanizer, one Splittorf coil unit (new), one Splittorf two cylinder dash coil. White to W. C. Denniston, Fayette, Iowa.

FOLDING PLATE GLASS FRONTS—Special offer, Mahogany frame, \$18.00. Full brass, \$21.00. Attachments included, runabout tops, \$19.50, touring car tops, \$34.50. Parsons-Curtis Top Co., Chicago, Illinois.

WANTED—Agents experienced in selling Automobile Accessories. We have a proposition that will interest you. Give age, experience and references. Rochester Timer Company, Rochester, N. Y.

FOR SALE

In order to make room for our new factory, we offer for sale at a low price:

- 1-18 h. p. 2 cyl. chassis.
- 1-18 h. p. 2 cyl. light delivery car.
- 1-20 h. p. 2 cyl. second-hand touring car.
- 1-14 h. p. 2 cyl. second-hand Ford motor and transmission.
- 1-10 h. p. single cyl. Cadillac motor and transmission.
- 1-12 h. p. single cyl. Olds motor and transmission.
- 1-20 h. p. 2 cyl. 4 passenger surry, 36-in. wheels.
- 1 chain drive running gear, runabout type.

BRENNAN MOTOR MFG. CO.,
103 Grape St., Syracuse, N. Y.

RUBBERLIFE—This is the name of a tire preservative, which every one of our readers will do well, perhaps, to investigate. Write to the Rubberlife Selling Co., 840 Real Estate Bldg., Philadelphia, Pa., mentioning THE AUTOMOBILE DEALER AND REPAIRER, for booklet entitled "Rubberlife Brings Tire Economy and Comfort." See their advertisement on another page.

SEATS—The Auto Rebuilding Co., 1311 Wabash Ave., Chicago, Ill., have a new an-



nouncement in this issue of a variety of styles of automobile seats for different makes of cars. They make seats for any car. Our readers who own Ford runabouts are requested to write for particulars concerning a proposition which will interest them.

SUPPLEMENTARY SPIRAL SPRING CO.—We learn from the Supplementary Spiral Spring Co., of St. Louis, Mo., that the Patent Office at Washington, on Oct. 30, 1909, rendered a judgment in their favor against John Hector Graham, which involved an application for a patent filed by Mr. Graham in 1907. We understand that

Buy from the Factory

Americano Cigars are strictly hand made, long filler. Superior quality tobacco. A high grade cigar at a minimum price, equal to what you are paying twice the price for. Sent direct to you from our factory at \$2.00 box of 50, delivered by express, prepaid, any place in the United States.

A. SALOMON & SON, Kalamazoo, Mich.

this company has commenced suit in the U. S. Circuit Court of New York against Mr. Graham and the company which he represents for infringements on their patents, which suit is now pending. It is hardly necessary for us to dwell particularly upon the merits of the springs manufactured by this company. Many of our readers are familiar with them and many more ought to be and will be probably. Full particulars may be obtained by addressing the company at 4524 Delmar Ave., St. Louis, Mo., or 1876 Broadway, New York City.

Please mention the Automobile Dealer and Repairer when writing to advertisers.

The Hydraulic

Price makes it the greatest value—Quality makes it valued the greatest

\$30.00



Works like a door
check—
Smooth as oil

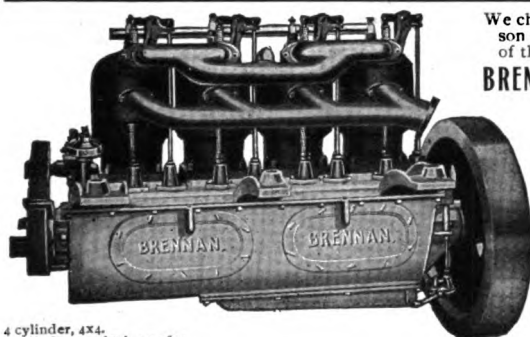
Send for Catalogue "A.D."

Emil Grossman
Company, Mfr.

232 West 58th Street
New York

BRANCHES:

Chicago, 1436 Michigan
Ave.
Detroit, 874 Woodward
Ave.



We challenge comparison
with other makes
of the
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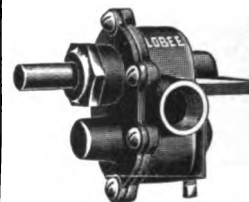
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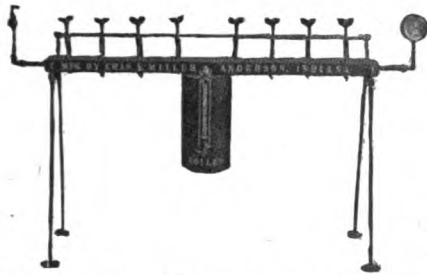
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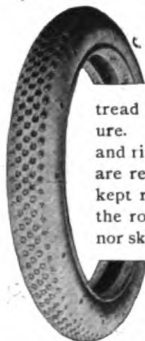
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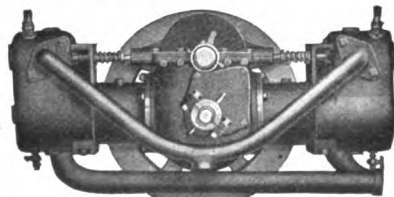
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32x4	18.00	6.25
33x4	20.00	6.00
34x3 1/2	15.00	4.25
34x4	21.50	6.75
34x4 1/2	22.50	7.50
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Positively Makes



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60 to 70%
STRONGER
and Practically
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Makes Tires Last Twice as Long
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using..... tires and..... rims.

Size of tire.....x.....

Name.....

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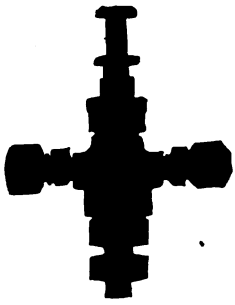
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You Cannot Adjust Your Carburetor For Low and High Speed

G-L ECONOMIZER CAN

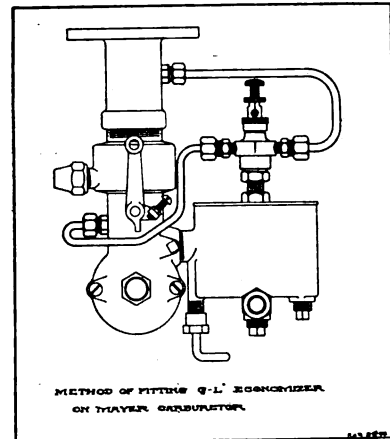
It stops faulty carburation, such as choking at low speeds, unequal firing of the cylinders, knocking of the engine when pulling up hill, and other troubles which every driver knows and has experienced. It gives the right mixture at all speeds. **INCREASES THE POWER 10% TO 20%.** Keeps the engine from over-heating. Allows faster acceleration. Provides quicker flexibility, better hill-climbing ability. Engine runs more smoothly. Each cylinder gets same quantity and quality of mixture. Carburetor will not flood. Tickling not absolutely necessary. Engine responds more easily to the throttle.

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This Is the Secret:

In every carburetor hitherto put on the market the pressure of air on the gasoline in the float chamber equals the ordinary atmospheric pressure. This pressure is constant, not being affected in any way by the speed or load of the engine. At the same time it is this pressure which forces the gasoline into the spray jet until the gasoline there and in the float chamber are level. This is a natural phenomenon which every school-boy knows. The suction at the jet, however, increases or decreases in proportion to the speed or load of the engine.

Take the pressure of air on the gasoline in the float chamber as 1, and the suction of the engine at 50 revolutions as 2. Thus the proportion of pressure of air to suction at spray jet is as 1:2. Now if we accelerate the engine so that the revolutions become 200, the suction has increased to 4x2 or 8, whereas the air pressure on the gasoline has remained constant at 1. If therefore the proportion of 1:2 is right, the proportion of 1:8 cannot be right. In this explanation lies the secret why a carburetor will choke when the throttle is closed or miss fire when the throttle is opened suddenly. So the only remedy is to vary the pressure on the gasoline in the float chamber in the same proportion or ratio as the suction in the spray jet varies, and this is what the G-L Economizer accomplishes.



This is the Result:

The depression or vacuum above and below the throttle is continually varying with each movement of the throttle, and as the suction pipe is connected with the Economizer and thus with the float chamber a mean depression is created in the float chamber which holds the gasoline at a constant level in the spray jet, allowing the gasoline to be easily accessible at low speeds and holding it back so that not too much is taken up at high speeds of the engine.

PRICE \$10.00 Sent by mail to any place in Canada, Mexico, Porto Rico, Philippine Islands, and in the U. S. A., upon receipt of \$10.00.

WELL KNOWN USERS WHO ENDORSE IT:

8 Mercedes Cars (70 H. P.) of the German Emperor are equipped with the G-L Economizer. Josef Hoffman, the musician, Peerless; Max Pemberton, the author, Spyker, Manuel Klein, from New York Hippodrome, Chalmers-Detroit 30; J. M. Hartshorn, New York City, 40 East 65th St., Roger-Schneider; Kearns Motor Car Co., Beavertown, Pa., Stromberg; Frank Bergen, Newark, N. J., Public Service Corporation of New Jersey, Packard.

It is the only device of its kind in the world and is fully protected by American and European patents. Write, mentioning what carburetor you use. We can give you some interesting information that will save you many dollars. Can be used on all gasoline engines. On the water, in the air, on land.

G-L ECONOMIZER CO.,

8-10 Thoroughfare Building,
1777-1779 Broadway, New York

ROTTERDAM: Leuehaven.

LONDON: 85 Fleet Street.

PARIS: 16 Rue Duret.

SOERABAYA (Dutch India).

COLN: 96 Hansaring.

G-L ECONOMIZER CO.
NEW YORK

Gentlemen:

Send C. O. D. to Mr.

address.....

Economizer to be used on a

.....carburetor of a.....car,
with the understanding, that if the device does not do
what you claim in 30 days, same can be returned
and you will return amount paid.

Signed,.....

7 YEARS'

Acetylene Burner War Ended. Alco Wins!
United States Supreme Court, at Washington, in Suits
in which we showed Non-Infringement of Dolan
"Air Enveloping" Patent 589,342, decides that
THE PATENT IS INVALID ANYWAY!

Thus we have, single handed, successfully prevented a Monopoly and Exorbitant prices on auto lamp burners.

Dealers will find (in spite of the readjustment of prices our competitors will be forced to make) that the most attractive prices on the burners selected by nearly all lamp makers as the most efficient, will be those any Jobber can quote on Alco goods.

Alco Burners, made of the Genuine German Lava, are produced in all shapes, styles, gas capacities and mountings for which there is a demand.

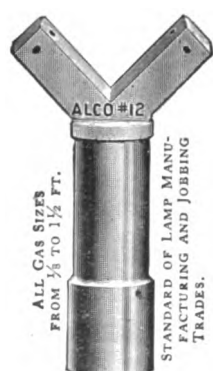
Our sole reliance for any reward for this costly struggle is that the User, Dealer and Jobber will all remember where the credit belongs and will insist on German Lava **ALCO** Burners.

Notwithstanding all the rancor of this bitter fight of over seven years, we have never lost sight of Quality in our Manufacturing Department.

To-day, where is the man or maker who has brought forth a better burner than the German Lava Alco?
Echo answers, "where"?

If you can't get better burners or better prices, are we not entitled to your support? We confidently rely on your sense of fair play.

THE NATIONAL FAVORITES.



GERMAN LAVA ALCO No. 12.



Alco Type 8



Alco DeLuxe



Helo-Brass Arms

N. B.—Don't be fooled by burners sold as "made of imported material." They call it "imported" when brought from Georgia into Tennessee! See that you get warranted Nuremberg Steatite (which material is non-porous and non-carbonizing). Only 2 brands of burners made in the American market are the **GENUINE GERMAN** Lava—of these two the one to remember and specify is "**ALCO**." (Trade mark registered.)

American Lava Company,
Chattanooga, Tenn.

You enjoy Acetylene on your Motor Car—then why not light your home, factory and church with it? If interested, write us.

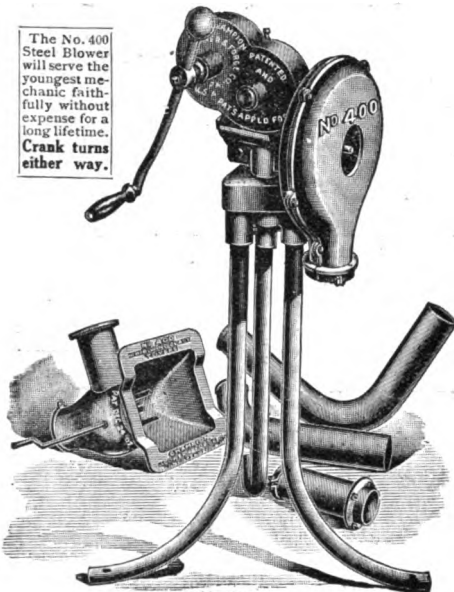
Please mention the Automobile Dealer and Repairer when writing to advertisers.

The Incomparable 400 Blower, the one great Heirloom that will be handed down from one Generation to the other, Ask What the Owners Say.

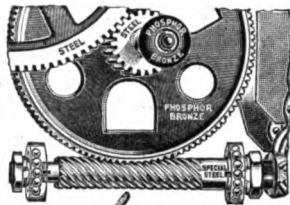
Now Over 450,000 No. 400 Champion Steel Blowers and Steel Forges

In the Hands of their Very Happy Users.

The No. 400 Steel Blower will serve the youngest mechanic faithfully without expense for a long lifetime. Crank turns either way.



No. 400.



It's all in the Spiral

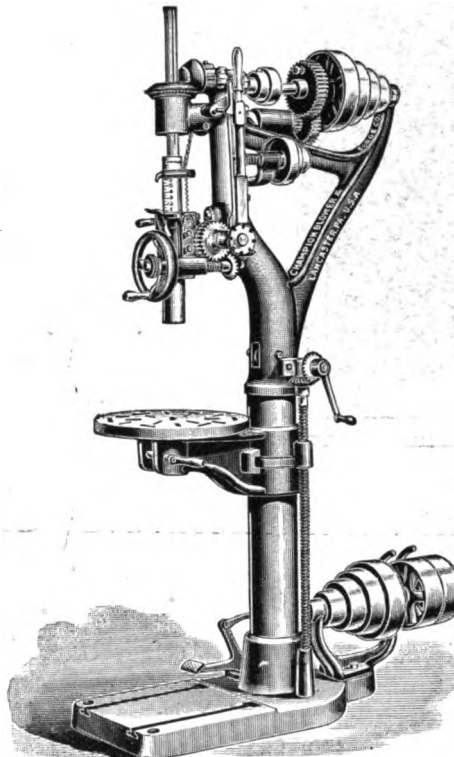
No. 401 CHAMPION Steel Rivet Forge we guarantee to increase the work over any other make of rivet forge 25%. It is built light, portable and convenient. It is equipped with High-Speed, Spiral Gearing and Adjustable Ball Bearings that will produce blast to weld 4 in. iron in ten minutes.



No. 401. With Shield.



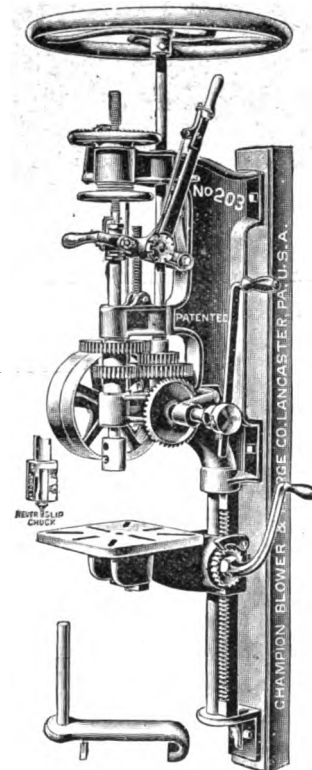
No. 403. Steel Horseshoers' and Blacksmiths' Forge with Half Hood. Hearth 30 x 36 in. Fan 12 in. in diameter.



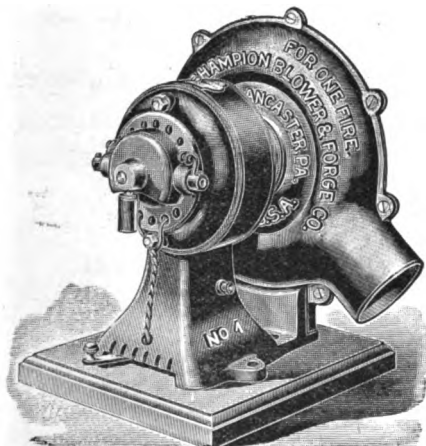
THE CHAMPION 20-INCH BACK-GEARED UPRIGHT POWER DRILL

A drill exclusively for power. Has three feeds: Power Feed, Hand Screw Feed and Lever Feed. Has Machine Cut Back Gearing for Heavy Drilling. Will Drill Holes from 0 to 1 1/4 inch.

Champion Tools are carried in stock by all the leading jobbers.



No. 203. Champion Automatic Self-Feed and Double Compound Lever Feed Drill.



No. 1. One Fire Variable Speed Electric Blacksmiths' Blower with five speeds for LIGHT, MEDIUM and HEAVY fires.



We make a full line of Screw Plates in four styles cutting to 1 1/2 in.

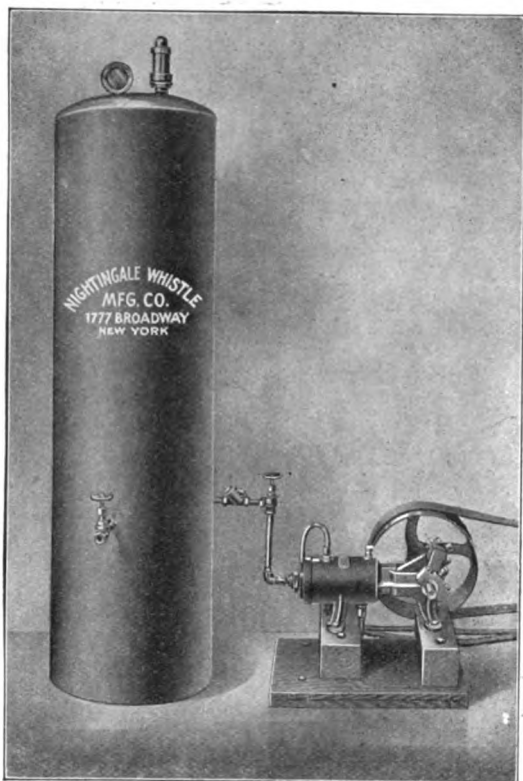
The Neverslip Drill Bit Chuck Invention Is Applied on All Champion Drill Spindles Without Extra Cost.

Our new 1910 catalogue can be had free upon application, showing the greatest variety and the very latest inventions in Blowers, Forges, Drill Presses, Tire Benders, Tire Shrinkers, Screw Plates, Power Blowers, Etc., manufactured under one control in the world.

THE CHAMPION BLOWER & FORGE CO., - LANCASTER, PA., U. S. A.

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GARAGE COMPRESSOR



No Garage Complete Without THE "IMPROVED DELPEUCH COMPRESSOR"

Of metal throughout—No leather packing or washers

Of highest grade material and workmanship

Compact—Works in any position

Is water jacketed and can be run continuously

Driven from 2 H.P. motor direct or from line shaft

Gives 200 lbs. or more pressure in the shortest possible time

COMPLETE OUTFIT

Exactly as shown in cut

\$66.50

with tank (for 200 lbs. pressure, guaranteed air tight, size 60"x12") safety valve, globe valves, etc.

Will furnish any size Tank desired.

Nightingale Whistle Mfg. Co.

1773 BROADWAY, NEW YORK.

Semi-Annual Manufacturers' Clearing Sale of

TIRES AND TUBES

As the season is far advanced and all the factory orders are completed, the tire manufacturers find on hand a number of sizes they have too many of. They are closing out this surplus stock at prices less than actual cost of manufacture.

We guarantee these strictly new 1909 goods or refund your money, if found unsatisfactory, upon receipt. Orders filled upon receipt of 10 per cent. of order to cover us on transportation charges.

This lot includes Morgan and Wright, Hartford, Continental, Diamond, Goodyear, Ajax, and all the best makes of tires. Will sell the lot, while they last.

CASINGS AND TUBES TO FIT ANY CLINCHER OR UNIVERSAL RIM

SIZE	CASINGS	INNER TUBES	SIZE	CASINGS	INNER TUBES
28x3	\$10.50	\$3.00	34x3½	\$16.00	\$4.25
30x3	12.00	3.50	34x4	20.00	6.00
30x3½	15.00	4.50	34x4½	22.50	7.00
30x4	17.50	5.00	34x5	20.00	6.50
31x4	18.00	5.00	36x3½	12.50	4.25
32x3½	15.00	4.00	36x4½	22.50	7.00
32x4	18.00	5.50	36x5	24.50	7.50
33x4	20.00	6.00			

SINGLE TUBE TIRES

26x2½, \$9.00 28x2½, \$10.00 28x3, \$12.00

SEND FOR COMPLETE LIST

EXCELSIOR TIRE CO., 1775-1779 Broadway, New York City

Please mention the Automobile Dealer and Repairer when writing to advertisers.

DELCO IGNITION

WHY YOU SHOULD HAVE IT ON YOUR CAR.

Delco Ignition was designed for the man who wants comfort in motoring ; who has no desire to be called upon continually to adjust any part of the car. With Delco on your car the ignition problem is solved for you ; it has been worked out by experts in our laboratories, and you do not have to **guess** what its action will be.

SOME BIG DELCO ADVANTAGES :

1. No coil box on the dash, giving your car an up-to-date appearance.
2. No switch troubles, because the Delco switch is the best ever placed on automobiles.
3. Six dry cells will run your car 2,000 miles or more. The system can be operated with storage battery if desired. The only change is one of adjustment, which is made in our factory.
4. Delco systems are properly adjusted before delivery to you, and need not be adjusted again until you have run your car on this system **TEN THOUSAND MILES.**
5. No sparking at timer or at contact points. Nine-tenths of your timer troubles are eliminated by this one Delco improvement.
6. No vibrators on coils ; no master vibrator.
7. Delco will give you more speed, and better control at extremes of low and high speed than you have ever had.

Delco systems are made in the best equipped factory ever used for ignition manufacture. Every detail of their construction is in charge of experts and every part is made a little better than seems necessary. You get the benefit.

Our new 1910 Catalogue gives detailed description of the system. Mail coupon to-day and you will receive it by return mail.

THE DAYTON ENGINEERING LABORATORIES CO.

DAYTON, OHIO, U. S. A.

**DELCO,
Dayton, O.**

Mail 1910 Catalog to

Name.....

Address.....

Kind of Car Used.....

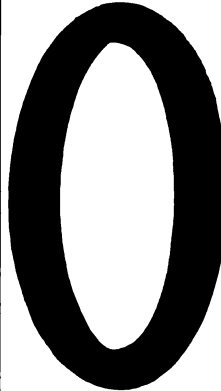
A. D. & R. Dec.

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Why These Tire Sundries Are Such Big Sellers

The Goodyear Tire & Rubber Company's Tire Sundries and Repair Material are not only the best for the customer to use, but they're the best for the dealer to sell. They satisfy the customer because they are made right and give him his money's worth—which is a good thing for the dealer—means more business.

Inside Tire Protector



New Life for Old Tires

Here is a cracker-jack seller. Everybody wants to get more wear out of old tires. The Inside Tire Protector will enable the user to secure big additional mileage from old tires practically worn out. It is made of four plies of fabric moulded to fit the inside of the casing. Great in repairing or preventing blowouts. Prevents the Inner Tube from being pinched in fabric breaks. Should not be used on new casings as it increases heat and friction. Comes in all sizes, from size to fit 28x3 tires at \$6 each, retail, up to 36x5 tires at \$13, retail.

Reinforced Blowout Patch

A small Fabric Patch, heavily reinforced, to repair fabric breaks inside the Casing. Patches have a frictioned surface on one side to make them adhere firmly to casing. Other side is bare fabric which won't stick to tube. Retail, 30c ea.

Tire Plaster and Inner Tube Bag

Here you have two very useful specialties. The Tire Plaster is made from two plies of frictioned fabric with 3-ply heavy fabric reinforcement between. It has a flap on either side to fit around the bead of the tire and repair a rim-cut. At the same time, the heavy reinforcement will repair any ordinary blowout. Three sizes, 50c or \$1.00 or \$1.25 retail, for all size tires from 2 1/2-inch to 5-inch. Extra tubes carried in Goodyear Inner Tube Bag won't come in contact with oils, greases and sharp tools. Nor can tubes be chafed through from shuffling about in car. Bag made of frictioned fabric—waterproof. Holds 2 or 3 tubes, according to size. Retail, 80c each.

THE GOODYEAR TIRE & RUBBER COMPANY, Sprague Street, AKRON, OHIO

Branches in all the Principal Cities.



Repair
Kit
No. 2

Note How Necessary to the Autoist

Repair Kit No. 2 is most saleable—at a price reasonable to the consumer. It is a complete outfit for repairing Auto Tubes, containing 6 assorted Inner Tube Patches, 2 tubes C-35 Cement, Emery Paper, Valve Caps, Valve insides, Valve Nuts and Washers, all neatly packed in tin box. Retail price \$1.00.

See This Rim-Cut Patch!

NEW, BUT—Already a Big Seller

Just new this year, this patch is already one of the best selling propositions we have. There is nothing made just like it. Of best frictioned fabric, heavily reinforced and cured in shape to fit inside the casing. Provided with a fabric flap that fits around the bead of the tire, holding Patch firmly in place—protecting any rim-cut which may have developed. Heavy reinforcement also takes care of and repairs blowouts perfectly. In three sizes, for all sized tires. Retail, 50c or 65c or 85c. Just write for price list and our book, "Care of an Auto Tire." Then you'll KNOW how repairs that will stay repaired are made.



Rim-Cut Patch

REVOLVING CASES



No manufacturer, dealer, or repairer of automobiles should be without our Cases. They occupy but a small space and capacity is very large. Each case guaranteed to give satisfaction. Used for bolts, screws, and small parts. Made in 32 different styles and sizes. Send for catalogue and price list. Manufactured by

AMERICAN BOLT AND SCREW CASE CO.,

Dayton, Ohio, U. S. A.

NEW DOVER Automatic Gasoline Shut-off Funnels.

PATENT APPLIED FOR.



NEW
GARAGE
SHAPE.

Positive in
action,
simple in
construction
and
everlasting
in quality.

Made in Two Sizes,
Galvanized.

Made in Three Sizes,
Copper Plated.

Simply Lift the Funnel from the filling hole or can and No More Gasoline can run through the spout. A necessity to Safety and Economy.

Send for 1910 Catalogue.

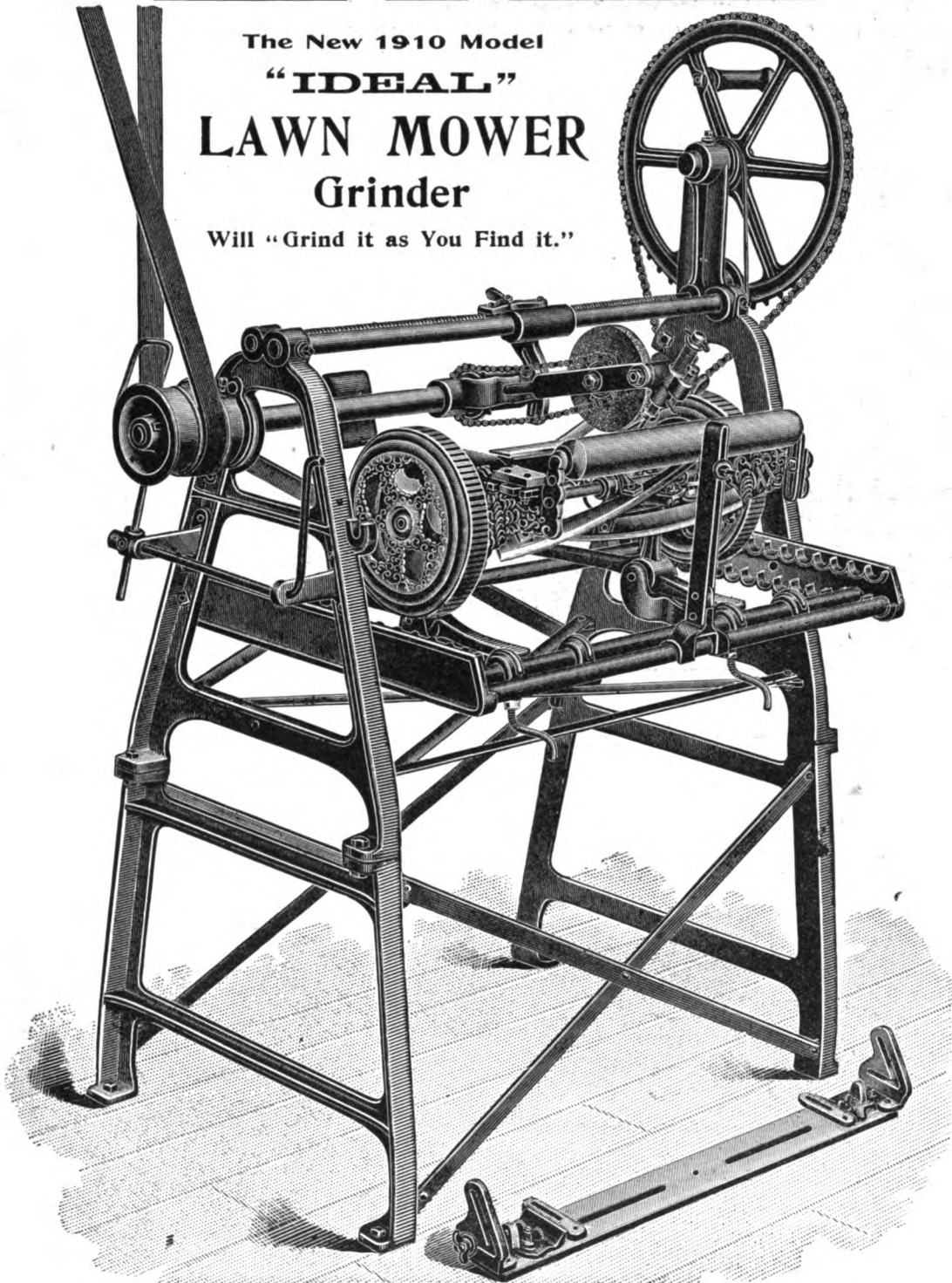
DOVER STAMPING AND MFG. CO.,
CAMBRIDGE, MASS.

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No Matter if the Knife is Bent or Sprung

The New 1910 Model
"IDEAL"
LAWN MOWER
Grinder

Will "Grind it as You Find it."



Patented Dec. 29, 1908

The ONLY machine that grinds the *Reel Knives* to fit the straight blade even if the latter is *bent or sprung*—the most important feature of Lawn Mower sharpening. Has ball-bearing Grinding wheel, babbitted bearings, easier running than any other. Grinds any style Hand Mowers perfectly in 15 minutes, without removing wheels or ratchets. We originated, and have 6 years' experience. Heavier, stronger and better than any other. Over 3000 in use. Fully warranted. WRITE FOR CIRCULAR AND SPECIAL TERMS TO EARLY BUYERS TO-DAY.

THE HEATH FOUNDRY & MFG. CO., Plymouth, Ohio

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MONEY FOR THE REPAIR MAN.

At this time of year, when owners are having their cars overhauled and assembled, there is no greater source of income to the repair man than

PYRAMID ALUMINUM FLOOR COVER.

The rubber floor cover in common use is, owing to the advancing price of crude rubber, growing poorer in quality and higher in cost.

Aluminum floor cover is

CLEAN—EVERLASTING—ELEGANT.

It is furnished in sheets and cut and laid as easily as rubber or linoleum.

Our Circular F-31 gives full description and prices.

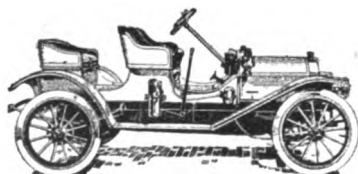
Live Wires, Get Busy! Write To-day.

FACTORY SALES CORPORATION, 1438 Michigan Avenue,
CHICAGO, ILL.

Bad Roads Don't Matter

If It's A

"The Car Ahead"



**\$1,100
Completely
Equipped
Including
Magneto**

Cartercar

The Cartercar has but very few parts and is a wonderfully simple automobile.

It has a friction transmission and chain-in-oil drive.

This gives an unlimited number of speeds, and delivers the motor power to the rear wheels with very little loss.

For these reasons bad roads, hills, sand, etc., don't matter with the Cartercar.

A boy can learn to drive and care for a Cartercar in a short time.

Its mechanism is so simple, that it is practically impossible to injure it in operating.

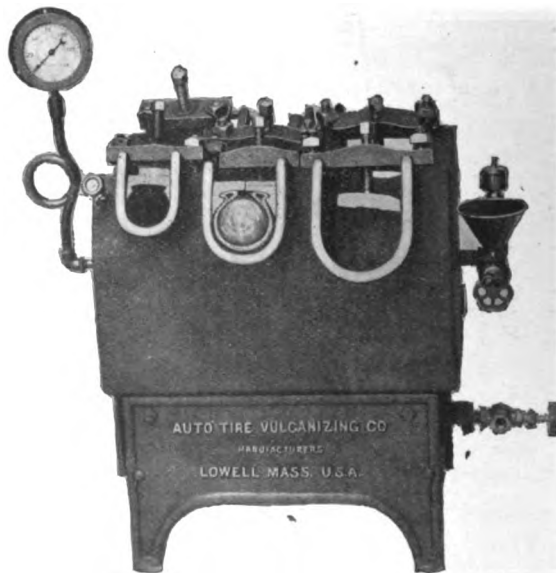
The Model "H" as shown above is **\$1,100**; with double rumble seat **\$1,125**; with double divided rear seat **\$1,150**; with miniature tonneau **\$1,150**.

Magneto, gas lamps, generator, oil lamps, horn, tools, jack, etc., included in equipment.

Write for new 1910 Catalog.

Cartercar Company,
Pontiac, Mich.

OUR NEW No. 7, 1910 MODEL ADJUSTABLE SECTIONAL VULCANIZER WITH THREE CAVITIES



Capacity from 2 inch Motor Cycle to 4½ inch Automobile tires. It has twelve pair of head irons, thus insuring a perfect fit for all the various makes of tires, either Clincher, Dunlop or Goodyear style or Flak mechanically fastened, also the Clincher type of motor cycle tire. This Vulcanizer is furnished with gas or gasoline burner or to connect direct to steam boiler. Our new 1910 Vulcanizer is cast in one piece and is steam jacketed like all our other vulcanizers. You cannot afford to be without our Three Cavity Adjustable Sectional Vulcanizer. It is a money maker and a money saver. Write for Catalogues and Discounts.

AUTO TIRE VULCANIZING CO., LOWELL, MASS., U.S.A.

Please mention the Automobile Dealer and Repairer when writing to advertisers.

How to Save Tires and Prevent Skidding

A Booklet Free on Request



Improved Self-Adjusting Tread

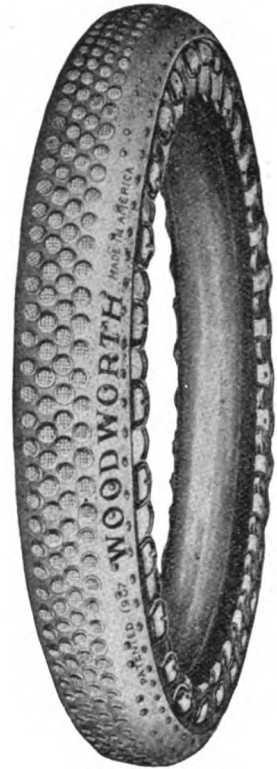
THE 1910 Catalog of the Leather Tire Goods Co. shows the latest designs and improvements in goods for saving tires and preventing skidding.

It shows amongst other things the Woodworth Improved Self-Adjusting Tread, a new tire protector for 1910 which is held on the tire by coil springs along the edges which automatically adjust themselves, always holding the cover at just the right tension on the tire, preventing any possibility of chafing or injuring the rubber tires. These sell at about half the price of tires and will save more than double their cost besides eliminating punctures and skidding.

The new catalog also shows the Woodworth Tire Chains, the only tire chains that save the tires instead of injuring them. These have strips of heavy chrome leather under each cross-chain, preventing the metal from wearing and injuring the rubber. They are made in two styles: the familiar side chain style, which has an improved method of fastening that automatically tightens the chain, preventing any rattling or striking of the guard; and the single chains, which can be snapped to the spokes. Unlike other single chains, they cannot cut grooves across the tire.

The catalog shows, besides the above, the Woodworth Adjustable Tread, fifty thousand of which have been sold in the last three years, the Woodworth Repair Boots, patches, etc.

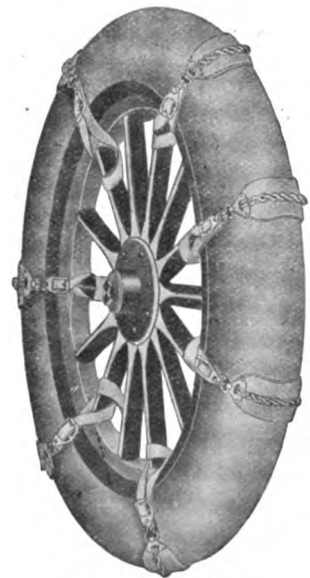
Tire prices are exceedingly high and seem likely to go even higher; it will certainly pay you to have the latest information in regard to saving them. Send coupon or write for the catalogue.



Adjustable Tread



Side Chain Style



Single Chains

Leather Tire Goods Co.

Niagara Falls, N. Y.

LEATHER TIRE GOODS CO.

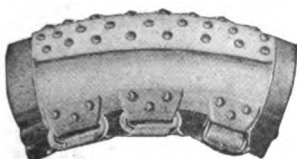
NIAGARA FALLS, N. Y.

Gentlemen:

Please send me your 1910 Catalogue.

Name.....

Address.....



Light Repair Boot



Heavy Repair Boot

Please mention the Automobile Dealer and Repairer when writing to advertisers.

LENGTHEN THE LIFE OF YOUR TIRES



BEFORE

GET 5,000 to 10,000 miles more running out of your old tire casings by letting us triple tread them. No matter how worn or ragged they are, we can, at small cost make them equal to new. They will be Puncture Proof; Non Skidding. They will run thousands of miles with never a puncture or a blow out.

Using the original casing as a foundation we build up practically a new tire. A heavy coat of new rubber of graduated thickness is first applied to the old casing. This is entirely covered with the best water-proofed French Chrome Leather which has been rubberized by our own special process.

The fibres of the leather are thoroughly permeated with the elasticity of the rubber. It has the appearance and resiliency of



A sectional view of Casing which has been triple treaded. Note the layer of rubber which protects the inner casing and the outer covering of rubberized leather with the anti-skid steel studs on top.

rubber combined with the toughness and wear resisting qualities of the best and most durable leather.

And just at the point where the most wear comes we add a third thickness of the rubberized leather. This is studded with from three to six rows of hardened steel studs (according to the size of the casing), this making a practically skid-proof "new tire."

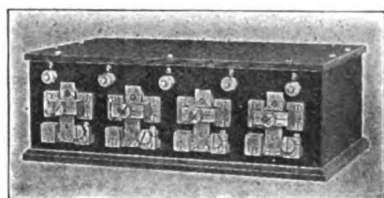
By bringing your old tires to us to be triple-treaded, you can cut your tire bills in half. The cost of triple-treading is small—less than the price of an inferior new tire—hardly more than a rubber retread. Don't buy new tires, send the old ones to us. Anyway ask us for further details of this form of tire economy.



AFTER

TRIPLE-TREAD AUTO TIRE MFG. CO.
1543 Michigan Avenue, Chicago, Ill.

TELEPHONE CALUMET 2458



**SCHUG
Electrical
Specialties**



Are the
World's Best
by Every Test.



SPECIAL PRICES TO THE TRADE.

WRITE TO-DAY FOR CATALOGUE.

SCHUG ELECTRIC MFG. CO., DETROIT, MICH., U. S. A. 326 E. JEFF,
SEATTLE MARINE SUPPLY CO., Seattle, Wash., Pacific Coast Agents.

AUTOMOBILE Running Gears, with pressed steel or angle iron frames, also chain or shaft drive. Any wheel base up to 138 inch, and any height of wheels.



Also All Kinds of

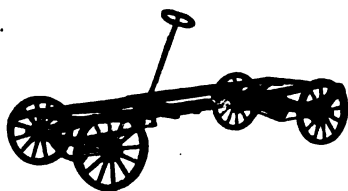
BODIES Wheels, Axles, Steering Devices, Springs, etc.

WRITE FOR OUR NEW CATALOGUE AT ONCE.

BORBEIN AUTO CO.,

2109 & 2111 N. 9th St.,

ST. LOUIS, MO.



You need not be afraid of the Devil



If you carry an M. & M. QUICK REPAIR OUTFIT in your tool kit. Repairs made anywhere, any time, any place. It's instantaneous, positive and self-vulcanizing. It's reliable too, and you need not be an expert to use it. Just follow directions and you will be surprised how easy repairs can be made.

With each outfit you can make about \$20.00 worth of repairs. Start now by curtailing expenses and repair your own punctures.

Outfit consists of ¼ pint Cement, ¼ pint Acid, 1 Cement Brush, 1 Acid Brush, Emery Cloth, complete directions, etc. Complete, \$1.00.

At all dealers and jobbers, or, sent prepaid on receipt of price.



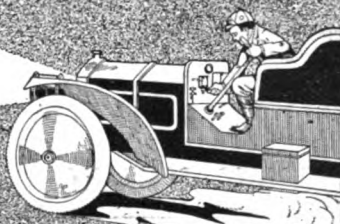
Manufactured by **THE M. & M. MFG. CO., Akron, Ohio.**

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TIME TO LIGHT UP



THE OLD WAY



THE INST LIGHTER WAY

GET THE INST LIGHTER.

Used with a gas tank—no matches—no adjustment of gas—a delightful convenience—never fails—Your dealer can install it for you. Giving perfect service on thousands of the best cars. When buying a new car be sure to order the Inst Lighter put on at the factory. It saves its cost in gas in less than one season. Fully Guaranteed.

To light gas headlights, all you have to do is open controller at A and press button at B. Adjustment is constant at C.

Price complete with coil, tubing, wire, etc., and illustrated instructions for installing, \$15.00.

SEND FOR CIRCULAR.

THE INST LIGHTER CO., COLUMBUS, O.

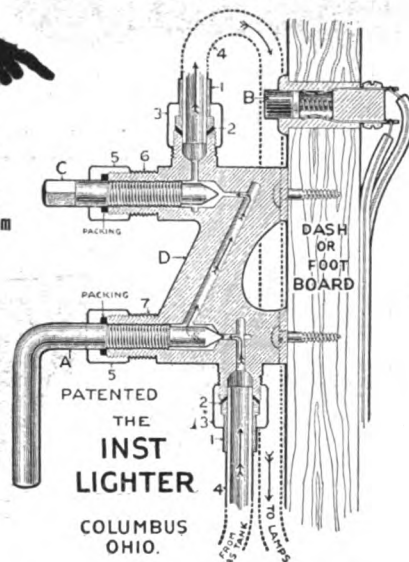
LIGHT

Your gas lamps instantly, conveniently, by turning a gas cock and pushing a button, both located on the dash of your car, where you can reach them without stopping or

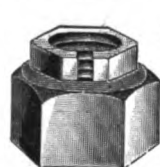
GETTING OUT



Note the Simple, Effective Mechanism

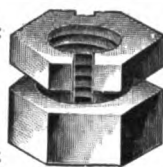


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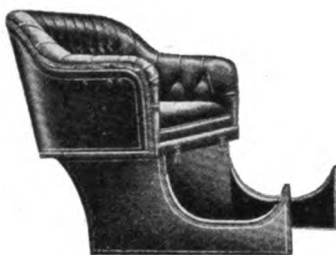
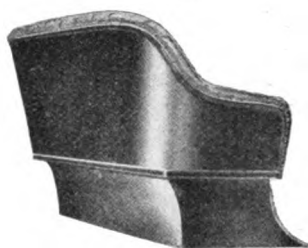
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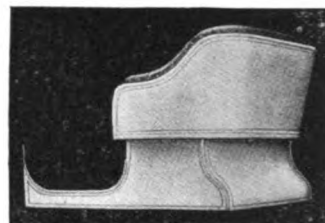


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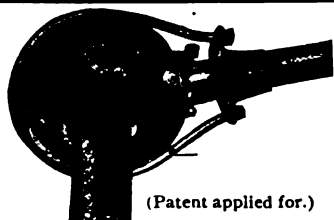
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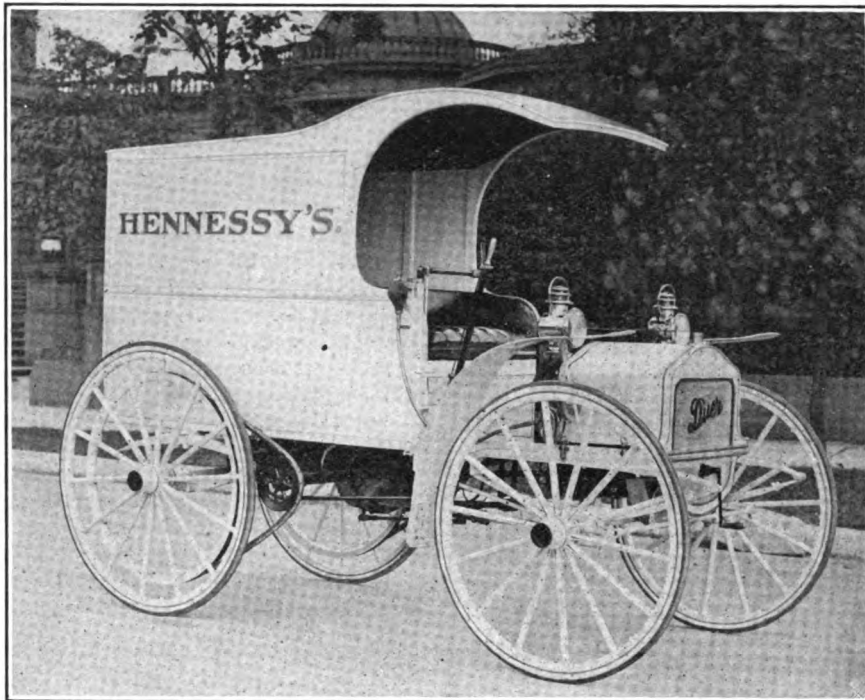
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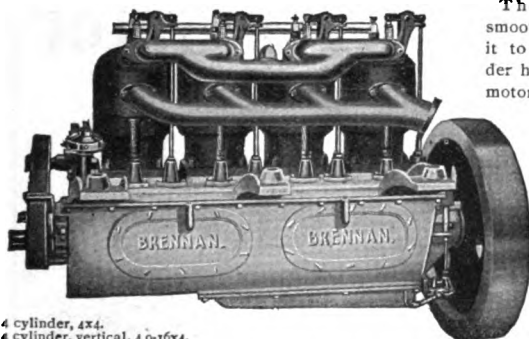
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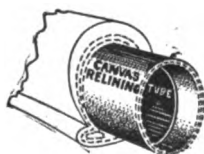
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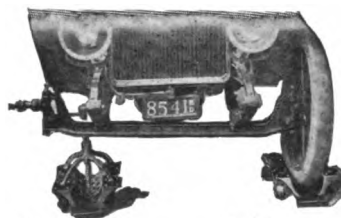
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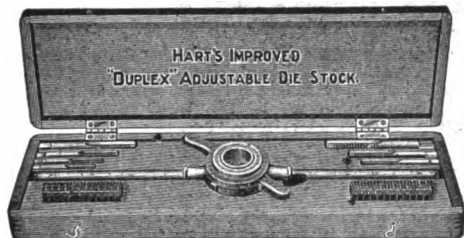
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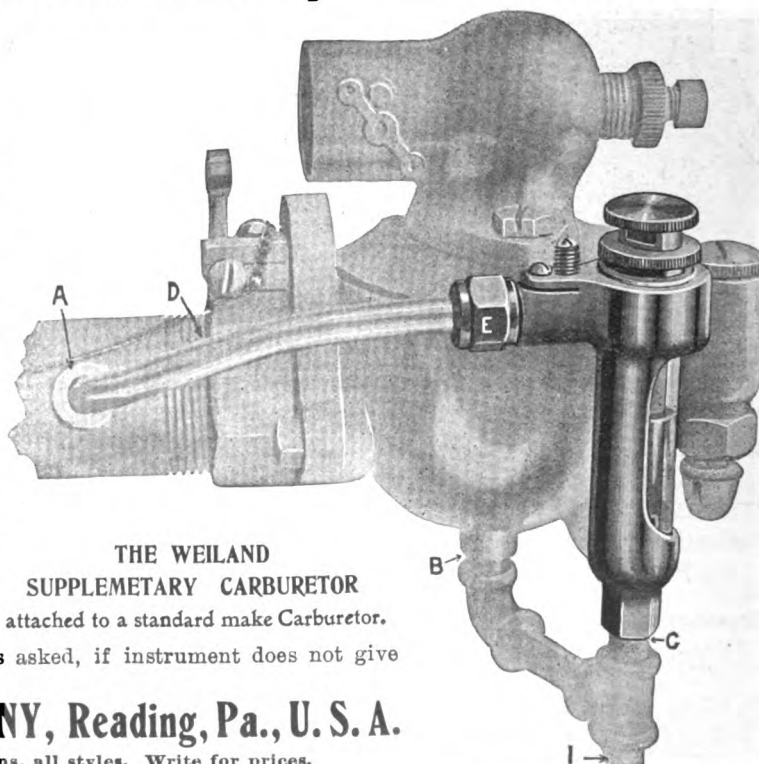
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VOL. VIII, No. 4.

NEW YORK, DECEMBER, 1909.

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EXTRA SEATS.

Various Types Explained That Are Used by the Most Up-to-Date Cars.

Automobile owners and dealers are constantly taxed to know what form of auxiliary seat is best adapted to their particular need, and while circulars and pamphlets showing the makers' claims are easily accessible, we believe the accompanying illustration showing collectively several types of seats and explaining their relative merits cannot be otherwise than appreciated by automobile users.

Every car owner faces at some time or other the proposition of utilizing every inch of seat space, and therefore every car body that can possibly be fitted with an auxiliary seat should be so equipped. That

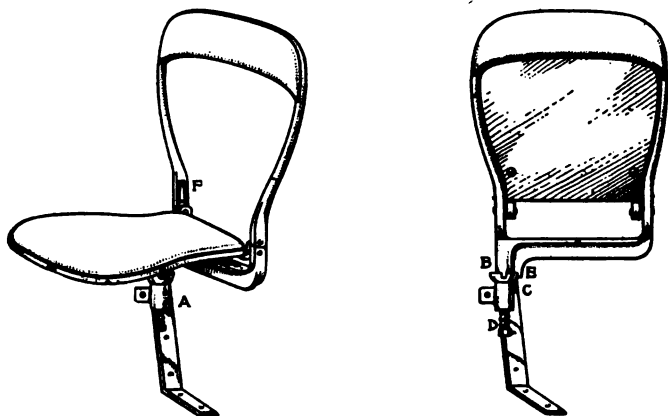


FIG. 1

this is perfectly feasible, the accompanying illustrations will demonstrate.

The great objection to most types of auxiliary seats heretofore, has been that the method of fastening or securing them in the body, has necessitated the use of brackets or side braces that were a permanent fixture in the body and when the auxiliary seats were not in use or were removed, these brackets would project out and be a menace to the occupants.

The accompanying illustrations represent a range of different seats that are in use in up-to-date cars, and while there are many others, some of which are just as good, we show enough to illustrate our article and also to give the reader a definite idea of auxiliary seats.

Fig. 1 shows a folding type of seat that is probably as popular as any in the market to-day. The illustration shows this seat in two positions, that is, in position for use and facing forward, folded up and turned round close to the side. This seat is very strong, being made entirely of castings and is made to revolve on the center, the socket part having two notches or slots, B and C. These notches are 90 degrees between centers and the seat has two positive positions, forward and close to the side of the body. The spring D keeps the key E tightly engaged in the notch. The

back is flexible, having a movement backward and forward as shown at F. This permits of the back having a generous slant for comfortable seating and to permit of passing behind the seat, or when the same is revolved

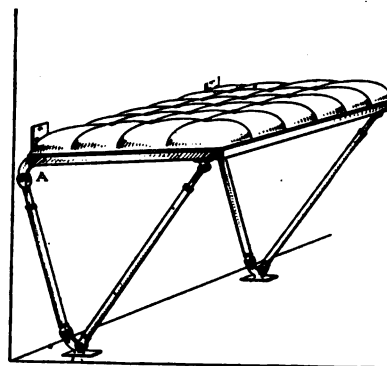


FIG. 2

round to the side, the back can be moved ahead at the top, until it is nearly perpendicular with the base. This permits of it fitting close to the side when not in use and also allows of its being placed 10 1/4 inches from the front of the rear seat, thus economizing the room in the tonneau. The seat and back are generally trimmed plain.

Fig. 2 is a form of seat that is popular for use in taxicabs and very small closed bodies. This seat is fastened to the front division and requires only 30 inches between the rear seat and the division to permit of its use, as shown in the illustration. The seat is large enough for two people. In general custom, however,

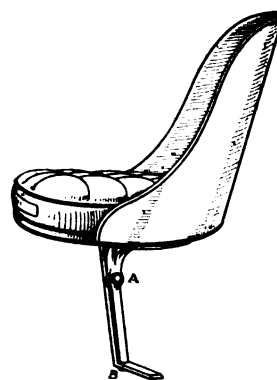


FIG. 3

two small seats are preferable as this will allow of easier passage at the doorway. By turning up one seat the occupant of the opposite side is not disturbed. The support is formed of tubing that telescope and the rear tube is fitted with an internal coil spring that presses up, this with the fastener, A, holds the seat either in its horizontal or perpendicular positions, as the fastener, A, carries the pressure out of center and the seat cannot be shaken from its set position. When

the seats are made single one support only is required for each and is placed in the center of the frame.

Fig. 3 is a revolving seat and is designed to be used only in a body where the room inside is generous. This seat is very comfortable and strong. The bearing on which it revolves is formed by two circular plates of large diameter and through the center is a large bolt. This is also reinforced with a collar on one plate that engages with a counter bore in the companion plate. This seat can be readily detached from the body by removing the screw, A, which is tapped into the body brace. It will be noticed also that the foot of the seat support terminates in a taper that engages in a slot in the body brace at B. This has the effect of steadying the seat. The back is slightly flexible, being formed of $\frac{3}{4}$ -inch oval iron, and the trimming is quite thick and tufted like the cushion.

Fig. 4 is specially designed for use in bodies where the room inside is limited for a revolving seat. This type is light, forms a comfortable seat, and can be either revolved to the side when not in use or removed, without necessitating the removing of screws. The

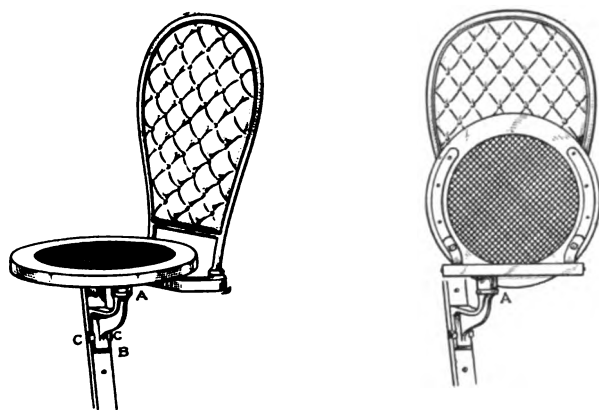


FIG. 4

seat is shown in two positions, folded and ready for use and also revolved on its center, A. The seat bottom is small, but when caned as shown in the illustration, the maximum amount of seat room is secured. To remove the seat from the body it is only necessary to tap lightly the bottom of the brace, B, and this will free the seat from the lips C, when the seat can be lifted free from the body. This leaves the body free from objectionable projections and the seat can be either tucked away under the rear seat until wanted or left out entirely. The back of this seat is trimmed and the seat is flexible enough to ensure comfort when in use.

When making selection of seats to fit a given size of body the above illustrations will make a fair comparison. For Fig. 1 seat, have approximately 38 inches between the back of the front seat at the bottom and the front of the rear seat on a touring car, and for a closed body measure from the back side of the division to the rear seat. Fig. 4 seat can be used in a space as small as 35½ inches. Fig. 2 requires only 30 inches to give comfort, and Fig. 3, the largest seat, should have not less than 40 inches. These measurements are to be taken between the points designated for Fig. 1.

How to Economize.

If the motorist is willing to take a little pains, he can reduce very greatly the rate of wear of his vibrator points by periodically reversing the direction of current flow through the system.

How They Sell Cars.

The art of automobile selling is progressing, and what some agents do not know about convincing an uncertain customer is hardly worth considering. At a meeting of an association of agents not long ago one actually declared that he had made a demonstration car ford a river down in Pennsylvania. How did he do it?

"Why, simply wrapped a rubber blanket around my engine to keep out the water and ran the car in. The engines kept on going and the car ran through the water all right. You bet I made a sale."

Another told how he had forced a car up a 75 per cent. grade in order to demonstrate the power of its engines. Another demonstrated how he had induced a woman to take a touring car at a higher price when she had wanted to buy a little runabout. Still another told how he had got a prospective customer out of bed to make a sale and beat another agent.

Wear Goggles.

Some men make quite a boast of never requiring goggles, no matter how fast the car may be traveling, or how dust-laden or otherwise unpleasant the atmosphere. This neglect to wear goggles is a great mistake, and one that cannot help adversely affecting the eyesight eventually. In winter there are the cutting winds to guard against, which are intensified by the speed of the car when journeying against them. In summer, too, the continual impinging on the eyeballs of dust must have a very damaging effect on the delicate membranes. When it is considered that, in spite of washing the eyes, on returning from a motor ride without having used goggles, there are pieces of dirt which remain and work out in nature's good time by the next morning, it is pretty clear that the eyes have been singled out for a fusillade of particles which, to say the least, are unnecessary and unwelcome lodgers.

Four Automobiles to One Horse.

Chicago recently told a story of the rise of the automobile, a story that one hears everywhere, in a more impressive and convincing way than any other city. It kept a careful count of the vehicles passing 24 representatives points in the city. The result showed that on Sunday there were 64,571 motor cars passing these points within the counting period, and only 19,309 horse-drawn vehicles. In the counting period for a week-day there were 67,518 motor cars to pass these points, and only 16,456 horse-drawn vehicles.

Not content with the lesson shown by these figures, Chicago wished to make the lesson impressive, and when President Taft reached there on his great swing around the circle, the parade he headed had not a horse in it. As far as the eye could see there was one unbroken line of automobiles.

Look Out for Fires.

More fires and explosions are caused in garages by the liquids and vapors of gasoline under the car than by anything else. Remember that neither gasoline nor air is explosive by themselves, but mix them and the product is far more dangerous than gunpowder. There can be no question as to the necessity of providing thorough and effective means for draining the under pans of all chasses in order to prevent the accumulation of inflammable vapors and their liquids. But in addition to this, care should be taken to have the exhaust piping so arranged, that in the event of a leaky gasket or a broken muffler casing, there will be no danger of a discharge of sparks into the enclosure beneath the mechanism. Care should be taken to see that the muffler cut-out is not placed so as to permit any discharge under the car body.

SANE AND INSANE DRIVING.

Duty of Car Drivers and Owners and of Automobile Clubs.

At a recent meeting of the Wilkesburg, Pa., Automobile Club the following paper was read by a member. It is worth careful reading:

Remove the sin of speeding from the automobile, and the entire world is its friend.

There is no similarity between the operation of the automobile and the railroad train. The latter runs on a specially constructed road for its particular use. It requires no steering wheel; runs on rails, and is held strictly to direction by flanged wheels. On standard roads not less than two tracks are provided, so that traffic will not be opposed in either direction. Semaphore signals are provided to keep trains apart. Every train has an engineer and a conductor, who are experienced railroad men and must be familiar with rules governing every conceivable emergency, and must pass a rigid examination before the lives of the traveling public are entrusted to their care.

Speed under such conditions is not a crime, as it is surrounded with every possible precaution that the brains of man can suggest.

In contradistinction the automobile runs on any old kind of roads; many of them mere cow paths, with surfaces as rough as the stony beds of the mountain torrents. Its direction is controlled by a steering wheel. The roads are used by every conceivable kind of vehicle, from the baby carriage to the heavy traction engine; are used by pedestrians as well, and made playgrounds for children. Cattle of all description use them in passing from place to place, and often as pasture grounds; also as barn-yards by the farmer's poultry. The only rule of the road being that all have equal rights.

The automobile is operated by men, women and boys, most of whom are ignorant of the first rudiments of mechanics. For example, an autoist stating what he had done in trying to get his car started, said he had loosened all the nuts he found tight, and tightened all he found loose. Another had spent an hour trying to put a nut on the wrong way. A doctor at Syracuse filled the oil reservoir with maple syrup instead of engine oil. Had he used castor oil it would have been nearer right and more in his line. Cases in which the engines had been deprived of oil until the pistons stuck in the cylinders, are too numerous to mention. To say that such people are permitted to run an automobile without passing an examination and receiving a certificate from an automobile state inspector, is a disgrace to the intelligence of people of a civilized country. To let such people with automobiles loose on our unprotected highways, is inviting disaster, not only to the occupants of cars, but to every person or beast using and having equal rights thereto.

The incompetents are generally those who do the speeding, courting death at every sharp curve or defective piece of road, as well as endangering the lives of those who desire to use the roads conservatively.

To leave out of consideration mechanical incompetence, there are those, while having a thorough knowledge of the mechanism of their cars, become temporarily insane as soon as they take the driver's seat and put their hands on the wheel.

Perhaps the most dangerous automobilist is the intoxicant. Any man addicted to the use of liquor should never be allowed to run an automobile; far better that such be shot on sight when found, and thus save the lives of many by the death of one.

The present unreasonable and unlicensed manner of using the automobile is the cause of it having so many enemies. Let it be distinctly understood, however, this enmity is not against the cars, but their operators. The automobile is the safest vehicle ever used by man.

The homes along the highways are practically abandoned by their occupants during the dry weather, as the clouds of dust roll heavenward and engulf their houses and bury them in dust, making the use of their porches impossible, or even the raising of their front windows for the purpose of ventilation. Ladies walking on the roads have their fine clothes ruined by every passing car, unless the cars reduce speed and pass with consideration of the property of others.

I say this reckless driving can not long continue. The people will not stand for it, and if the automobile clubs will not take the matter in hand and have it corrected, the enemies of the autos—those who have suffered all kinds of annoyances—will take charge of the matter and pass laws putting the operation of the automobile on the same level as the horse-drawn carriage or wagon.

I favor and strongly recommend the passing of a law by the state legislature, prohibiting the use of any automobile unless it is constructed with an automatic fuel cut-off, making a speed beyond 25 miles an hour impossible, and that tampering with this device, whereby a greater speed can be made, be a criminal offense and punished accordingly. This will not correct all the auto evils, but will largely prevent the serious results due to drivers afflicted with the speed mania, or in other words, temporary insanity.

The auto clubs should also have the legislature pass a law requiring every driver of an auto to pass an examination as to his operating knowledge of the car he intends to drive, as well as his physical requirements, and he should receive a state certificate before he is allowed to operate a car. The automobile clubs can do no better work than to lend their enthusiastic and united aid in this direction.

Valve Stem Expansion.

It is well to never forget that heat expands and cold contracts. It is sometimes the case that there is a loss of compression when the cylinders are hot although everything is all right when they are cold. This may be due to the expansion of the valve stems by the warming process. Unless a proper amount of clearance is allowed between the ends of the stems and the tappets when the valve stems get warm they will not seat properly.



A garage designed for a runabout and in harmony with the garden wall.

FOUR-FIFTHS WASTED.

Enormous Loss In Running the Internal Combustion Engine.

It may not be generally known that in the average gasoline engine only about one-fifth of it is actually turned into power and the other four-fifths are wasted. Even at this rate it just about doubles that which is actually converted into power in the ordinary steam engines. Only about ten per cent. of all the heat generated in the steam engine is actually used for power and about twenty per cent. of that in the gasoline engine, while the other ninety and eighty per cent. go to waste.

If all the heat could be utilized for power and not a particle wasted, then a little five horsepower gasoline engine would develop 25 horsepower with exactly the same quantity of fuel that it now takes to put forth 5 horsepower. Five times as much work would be done at exactly the same cost for fuel. But under our present knowledge of converting heat into power there is no way of increasing the proportion of heat saved or decreasing that wasted. Now, why is it necessary to waste eighty per cent. in the gasoline engine and where does it go? If you stand near an engine that is running under a full load you can feel the heat radiate from it at quite a little distance away from it. This shows you that a large portion of the heat is lost through the cylinder walls and cooling water by means of radiation.

If the hand is held to the open mouth of the exhaust pipe it will be noticed that the exhaust carries away with it large quantities of heat. Radiation through the water jacket and cylinder walls and by the exhaust are the two great avenues of escape through which the heat is wasted. The temperature within the cylinders at the time of explosion is very high. It is an intense heat and since we have only the time of one piston stroke in which to convert it into power, much of this heat remains unused at the end of the stroke and must be gotten rid of in some way before a fresh charge of fuel can be put into the cylinder and ignited, and a portion of it converted into power to keep up the speed of the motor under its load.

If the heat from the previous charge were not exhausted or radiated and thereby reduced to a degree below the igniting point, it would fire the fresh incoming charge the instant that it entered the cylinder, before the receiving valve had a chance to close, and the result would be a back fire or an exhaust report at the mouth of the receiving pipe. The entire amount of heat generated by this charge would practically be wasted by coming out through the receiving valve. This would produce a case of pre-ignition or self-ignition caused by holding within the cylinder too much of the heat of previous charges, or what is sometimes called ineffective cooling of the cylinder. It is the aim of builders to so construct their engines with cooling jackets that the heat remaining after the power stroke is completed is exhausted and cooled down to a degree considerably below the flash or ignition point for the fresh charge.

The charge must enter a cylinder cool enough so that it will not be ignited by the combined heat remaining in the cylinder from previous charges and that created by the compression of the fresh charge. We must be able to keep the fresh charge from ignition until the proper time for its ignition has arrived, at which time the electric spark is made and fires it at the proper time to get the greatest benefit from the heat resulting from its combustion. Under present

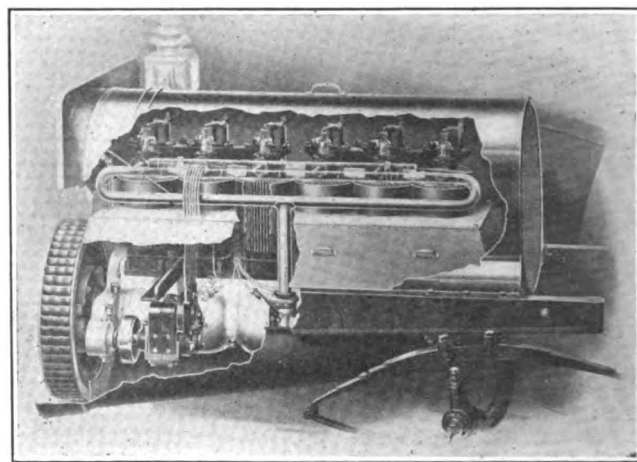
knowledge the best we can do is to harness up and actually convert into power only about from twenty to twenty-five per cent. of the heat energy in the gasoline engine. The balance from seventy-five to eighty per cent., is necessarily wasted.

AIR COOLING.

The New Franklin Engine and How the Air Current Is Applied.

That the Franklin car system of air-cooling is successful will not be questioned. It has been tested long enough to either stand or fall on its own merits, and it stands.

In the Franklin models for 1910—and they number 16—the most noticeable change is in the engine, but this change is not radical, it consisting mostly in applying to the cylinders the air-cooling current. Heretofore each of the cylinders has been encircled by a series of horizontal metal flanges shrunk onto the exterior wall and greatly magnifying the exterior, or heat radiating, surface of the cylinders. The same



Cutaway view of the Franklin air-cooled 1910 engine.

idea is carried out in the 1910 motor but the flanges are vertical instead of horizontal and are cast into the cylinder body instead of being shrunk onto it. This is the new way the current of cooling air is made to envelop the cylinders. In the previous engine the current of air taken from the front of the hood was sent back upon the cylinders by a gear-driven fan. This fan is eliminated now on the air-cooled Franklin.

In the 1910 Franklin engine each cylinder, with its vertical flanges, is encased in a cylindrical sleeve of sheet metal, and through the funnel-like opening thus formed there is drawn from top to bottom a strong current of air by a suction fly-wheel at the rear of the engine base. In order that the necessary suction from the cylinder enclosures to the fan may be effected the entire engine base is given a housing of sheet metal. The top of this forms a deck extending from the cylinder casings to the side members of the chassis frame. This with the pan below the engine forms a chamber in which the air pressure is by the fly-wheel kept less than atmospheric, and thus is produced the partial vacuum necessary to the induction of the air current from above. It seems quite likely that this suction fan creates a current of air far more powerful than that applied in previous engines. Increasing the amount of cooling air about the cylinders and doing it with less power, it increases both the cooling efficiency and the motor efficiency. Each cylinder, regardless of its distance from the opening in the front

of the hood, is provided with an equal current of air, of equal temperature, and is equally cooled. The front, back and sides of each cylinder are cooled alike, a uniformity of temperature being thus obtained for all parts of the cylinder circumference, the result being a clear gain of effective cooling surface.

The cylinders are cast separately, and each is equipped with the same number of flanges or fins. With the previous method of construction the number of fins was increased as the distance of the cylinder from the source of cooling air increased, this giving greater cooling by reason of greater heat-radiating surface to those cylinders which felt least the effect of the cooling fan.

The greatest difference in appearance of the new engine from the old is caused by the enclosing in sheet metal of all of the engine except the cylinder heads in order that the suction for producing the cooling current may be obtained. Marked simplicity is noticed at the first glance at the motor.

Three constructional features of the engine which are retained from the models of previous years are to be seen in an auxiliary exhaust, concentric intake and exhaust valves and a dome-headed cylinder. Each of these is a considerable factor in the Franklin system of air-cooling.

Of these three the auxiliary exhaust contributes most to efficiency in cooling. It opens at the base of the cylinder chamber immediately at the completion of the power stroke. The extent of the work done by it is shown by the fact that through it seventy-one per cent. of the hot, dead gases is immediately discharged and only twenty-nine per cent. left to be carried out through the main exhaust in the cylinder head and there liberated.

The arranging of the main exhaust valve and the intake valve so that they are concentric permits the use of large valves, which makes possible a large charge.

The dome form of the cylinder head is largely made possible by the concentricity of the valves at the summit of the head. The dome form of the interior is as close a practical approach as has been found possible to a spherical interior. The latter is a constructional aim of automobile engineers in general as it is productive of a minimum of interior, or heat absorbing, surface without lessening the extent of the heat-radiating exterior.

The illustration shows a cutaway view of the 1910 Franklin engine, and as will be seen, it looks practical, efficient and simple.

An Expedient Only.

If a car driver has neglected to carry emery paper or a file and the spark plugs need cleaning, a substitute can be found in the igniting composition on a box of safety matches. This can be used in the same manner as the emery paper, and while not quite as good, will clean the ends of the plugs effectively.

Look Out for This.

To start an engine while the car stands over a puddle of gasoline is attended with considerable danger, particularly when the muffler is sooty, as it may emit sparks, which may ignite the gasoline under the vehicle and cause an expensive conflagration.

Sealing wax dissolved in gasoline makes quite a good varnish for terminals. A little linseed oil in addition will prevent brittleness.

COOLING SYSTEMS.

The Thermo-Syphon Arrangement and the Danger of Salts In the Water.

BY SIDNEY F. WALKER, M.E.

The cooling system of any gas or gasoline engine is one of the most important parts of the apparatus, though it represents dead waste, and a very large amount at that. The cooling water carries off something like 30 per cent. of the energy delivered by the combustion of the gasoline vapor. Unfortunately it is absolutely necessary to carry off this heat, because unless it is done, and the engine cylinder is kept below a certain temperature, the incoming charge of gasoline vapor and air will be fired before it has time to fill the cylinder, and without any opportunity for compression, so that the work of the engine will be very small indeed. Motor cars are very heavily handicapped in the matter of the cooling system, because they must not carry a larger weight of water than

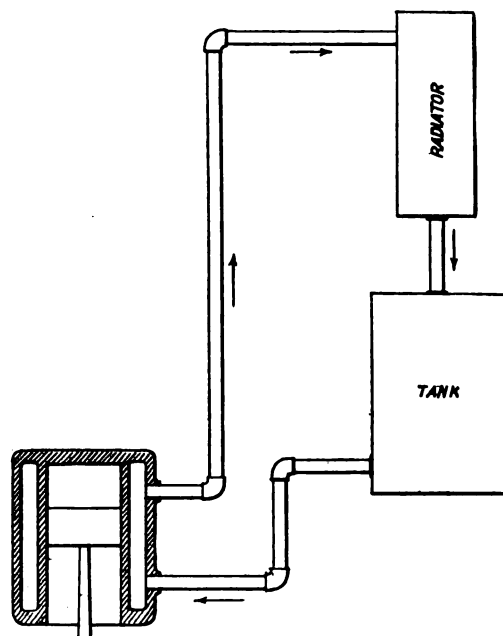


Fig. 1.—Diagram of the cooling circuit. The hot water from the cylinder rises to the top of the radiator and the cold water passes down to the tank and the cylinder.

can possibly be avoided. Every pound that can be saved legitimately is something gained. With stationary engines using gas, the problem of keeping the engine cool is a very simple one, even in comparatively hot climates, in the great majority of cases. It is only necessary to have a sufficient reservoir of water, such that the total rise in temperature of the reservoir will not be sufficient to reduce the cooling effect of the circulating water below a certain figure, and in almost every case it is merely a question of providing sufficient water. In the early days of the gas engine, trouble arose from this fact not being understood. A case came under the writer's notice of an engine that was sent to West Africa, and that could not be made to run for more than a certain number of hours. The man in charge came home and explained the trouble. He was instructed to increase his reservoir of water, and the trouble ceased.

With motor cars the supply of water that can be carried is strictly limited, and therefore the water has to be cooled after it has done its work in cooling the engine, by passing through the radiator. Fig. 1 shows the simplest cooling arrangement, the thermo-

syphon as it is called. The action is well known to automobilists, and is as follows: The surplus heat of the engine is delivered to the cooling water passing through the cylinder jacket, the cooling water carries the heat to the radiator, where it delivers it to the air, and then passes back to the tank, or directly to the engine where no tank is carried. Fig. 2 shows the arrangement without a tank. If the radiator is of sufficient cooling capacity to take out all the heat that is delivered to the water by the engine cylinders, the temperature of the water in the tank or that delivered back to the engine jacket, should not rise above a figure at which cooling will still go on. But there are frequent drawbacks. In the first place the radiator may not have sufficient capacity, under the best conditions, and the temperature of the water in the tank and in circulation is continually rising, until it ceases to cool the engine cylinders sufficiently, and then the engine has to stop. In addition to this, if the radiator has been designed with sufficient capacity for ordinary running, say on the level, it still may not be able to take out the heat from the cooling water at a sufficiently rapid rate, when mounting a hill, if the hill is of any length, or again if the motor car is running up and down a succession of hills. The heat is delivered

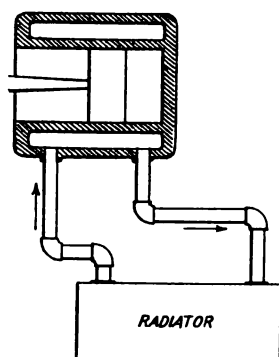


Fig. 2—Diagram of the cooling circuit without the water tank. The hot water — from the engine passes to the top of the radiator and the cold water from the bottom of the radiator passes back to the lower part of the cylinder jacket.

to the air passing through the radiator, as the motor car runs, and it will be obvious that the higher the speed of the car, the greater the cooling effect. On the other hand, in hill climbing, the speed is low, and the work the engine is doing, is nearly always high, hence the danger that the radiator may not be able to keep up to its work.

There is also a further and a very much more serious danger, to which all radiators, even the very best designed are subject, viz., the deposit of salts contained in the cooling water, upon the walls of the cylinder, and upon the radiator tubes.

It is well known that a large proportion of the water that is used for general purposes, contains certain salts in solution, and that the salts have a troublesome property. While the water is at comparatively low temperature, the salts remain dissolved, but when the temperature rises to a certain figure, carbonic acid gas, which is present in the salts, is driven off, and the salt which remains is no longer soluble, and is deposited upon the surfaces over which the water is passing. This trouble is met with to a considerable extent in steam boiler work, and numerous chemicals and other devices have been arranged to get rid of the salts before the water is allowed to pass into the boiler. If a deposit is formed upon the outside of the gasoline engine cylinder, the wall of the cylinder against which the cooling water impinges, a consid-

erable resistance is set up to the passage of heat from the cylinder to the water. And again, if a deposit of these salts is formed on the inside of the radiator tubes, considerable resistance is set up to the passage of the heat from the water to the air that is passing over the tubes. Careful experiment has shown that the effect of a very small deposit of these salts is very serious indeed, and its effect is unfortunately cumulative. That is to say, the salts will go on depositing upon the surfaces of the cylinder and the radiator tubes, as long as there is any present in the water.

There is a still more serious danger in this connection, viz., from the presence of oil. If lubricating oil is allowed to get into the cooling water, it will almost inevitably deposit upon some of the surfaces over which it passed, and it has been shown that a very fine film of oil is sufficient to resist the passage of heat through the metal surface it covers, even with very large differences of temperature, such as those between the flue gases in a steam boiler, and the water immediately surrounding the flues.

Water itself, it will be remembered, is a very bad conductor of heat. It carries off heat largely by convection currents, and the most efficient arrangement of cooling consists of a thin stream of the water passing rapidly over the surface, from which the heat is to be taken. In addition to the resistance offered to the passage of heat from the cylinder to the water, and from the water to the air, the presence of the deposit upon the different surfaces, tends to throttle the circulation of the water. The water available for cooling varies in different districts, but it will be wise for all owners of motor cars to obtain the purest water available for their cooling systems, and if reasonably pure water is not obtainable, to invest in a small water softening plant, and to remove the salts named from the water, before it is put into the engine, or else to use distilled water, or rain water. The writer proposes to deal more fully with the matter in further articles.

AWAY FOR THE WINTER.

More About Keeping the Car in Good Condition In Cold Weather.

Here are a few more points about keeping the car in good order while in storage during the winter, although there is no reason why it should not be used a greater part of the time. But in storing the car see that the building is free from dampness and well ventilated. A building not ventilated, heated or unheated, is not desirable. Dampness will exude from the ground and walls, especially after the cold spells and in the spring. A well-ventilated building will compensate to a great extent for the dampness of winter, but the circulation of air will disperse this on the bright and dry days. If heating apparatus can be had, so much the better, but it is not by any means essential to the well-being of the car if reasonable precautions in the matter of ventilation be taken. To counteract floor dampness, a half inch to an inch in depth of dry sawdust may be put on the floor before finally leaving the car.

The car should be raised by means of jacks or blocks supporting the front and back axles. Where detachable rims are used, it will be advisable to remove these and put a thin coating of grease on the metal parts liable to become rusted by disuse. In the matter of tires, the removing of them is optional, for it is not essential if air pressure, slightly below the normal, is retained and attended to. Gasoline and oil should be

drawn off into cans and the water run out of the engine, radiator, etc. No trouble should be spared to make sure that every drop of water is cleared from cylinders, radiator, water pump, pipes, etc., and the drain taps and plugs should be left open and detached.

The cylinders should not be washed out with kerosene until just prior to re-use in the spring, but by copious doses of lubricating oil insure that cylinder walls and pistons are well coated with oil. Drain out the base chamber, leaving the taps open, or the plugs out, so that sediment may not collect.

It is better to discharge and recharge the accumulators say once a month (discharging to 3.8 volts or so by means of a small lamp), while not in use, rather than the alternative of draining out the acid and swilling out with clean water, for they are then available immediately in the spring, and the otherwise careful recharging is avoided. The magneto should be left in position, untouched, but the clutch, if of leather cone type, should be well dressed with oil and retained from contact with the flywheel by securing the clutch pedal with wooden block or rope.

The leather upholstery may be treated with a small quantity of leather dressing well rubbed in, and all bright steel parts should be greased. A coating of oil on brass and copper parts will avoid serious tarnishing. The bulb of the horn may be removed and kept in a place neither very hot nor the reverse, but dark, to preserve the rubber.

AUTOMOBILE INSURANCE.

Points That Should Be Understood In Case of Accident or Injury.

The two divisions of automobile insurance, fire and liability, are distinct and should not be confused. Fire insurance is designed primarily to protect against loss from self-ignition, explosion, or other causes whereby the car might take fire. The current policy of this kind also covers a large number of other accidents, including accidents on the road, on a railroad car, or boat, loss from robbery, etc. For an additional premium it also covers loss from collision.

A motor car liability policy is primarily to indemnify the assured for damages imposed by law upon him, as a result of injuring any person or persons. In most cases this policy includes a guarantee against loss, up to a certain sum, for damages done to any other person's property as a result of the collision; and also insurance against damage sustained as a result of the collision, except loss by fire or by striking any portion of the roadbed, or the ties or rails of a street or steam railway.

These two policies combined cover practically every contingency which is likely to occur, and while the same company does not usually issue both policies, it has become customary for agents of companies seeking liability insurance to offer the fire policy at the same time, and then turn over the business to some other company. Of course differences exist in the policies of the various companies which scarcely affect their value to the motorist. But the motorist should thoroughly understand the terms of a policy before accepting it. Few people trouble themselves sufficiently to ascertain these necessary facts, but take rather the general statement of the insurance salesman. The assured should insist on having the "value form" issued by the fire company, giving the value at which the car is appraised by the company.

In the event of a car being damaged by fire, the owner should immediately notify his broker of the

fact, with such details as he is able to give. This should be done, if possible, on the same day as the accident occurs, although longer time is allowable. But speedy action means speedy settlement. The broker in turn notifies the company, and an inspector takes the car in hand and makes an appraisal of the loss to the broker.

All companies keep a staff of inspectors, who are always practical men, either engaged in the manufacture or repair of machines, and usually their appraisals are fair and accurate. In cases of dispute the company and the assured each appoint an appraiser, and these appoint an umpire to adjust the matter. This method is somewhat expensive for the motorist and is not often resorted to.

A car should not be left unprotected on the road after an accident has occurred. Under the conditions of the policy, the motorist is presumed to care for the vehicle until the company's inspector arrives.

In case of fire or damage by collision, remember these things:

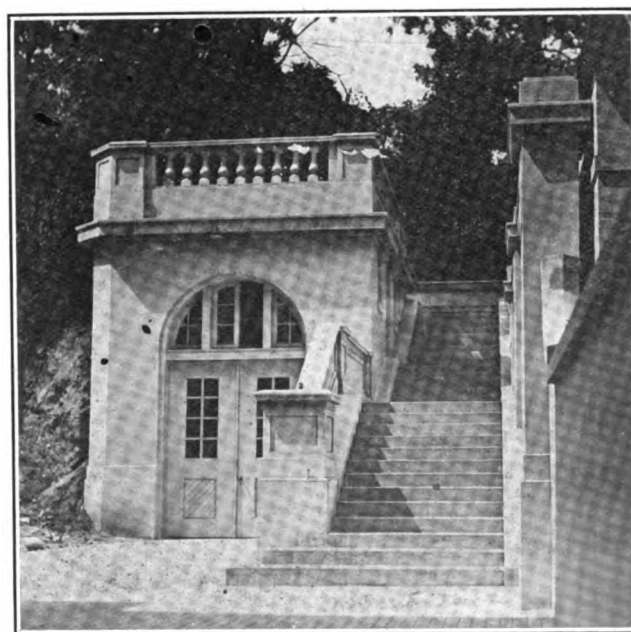
Notify your broker or the insurance company immediately, giving complete details and an estimate of the amounts of the loss.

Remember that all reasonable expense incurred in an effort to save your car, constitutes a claim under the policy.

Don't desert your car, no matter how badly damaged it may be, until the insurance inspector arrives.

In case of injuring a person or persons or damaging property other than your own by collision: Immediately secure the names and addresses and, if possible, the statements of the injured or of the owners of the property damaged; and also the names and addresses and statements of all witnesses of the accident. Upon the receipt of summons and complaint send them, together with the data gathered at the time of the accident and your statement as to how the accident occurred, to your broker or direct to the insurance company.

Remember that for all expenses incurred at the time of the accident, in providing immediate surgical relief, you will be reimbursed by the company.



Garage made to harmonize with a city mansion.

Automobile Dealer and Repairer

A Magazine of condensed and compact information for busy readers.

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ADVERTISING RATES MADE KNOWN ON APPLICATION

NEW YORK, DECEMBER, 1909.

Missing Numbers—Our readers are requested to remember that it always gives us pleasure to re-send numbers which have gone astray in the mails.

The Automobile Dealer and Repairer in Australia and New Zealand.

Mr. R. Hill, Matlock House, Devonport, Auckland, New Zealand, is our accredited representative in Australia and New Zealand for obtaining new subscriptions.

LICENSE AND SPEED.

The agitations favoring an examination to secure a license for the privilege of running automobiles as an alleged protection to the public, and for uniform speed laws for the same purpose, still continue.

These are mistaken notions and are based upon a misconception of both the cause and prevention of accidents and of public safety.

Knowledge of engineering, of the construction of a car, of the use of the levers, of the ability to start, to stop and to steer, are like the "flowers that bloom in the spring," they have practically nothing to do with accidents or the public.

Accidents are invariably due to recklessness, to indifference, or to the fancied belief of the driver that he knows it all. It is true that a knowledge of the construction, operation and care of a car has much to do with its usefulness and exemption from injury, but this is altogether a private matter; it concerns the owner or user only and is not of the slightest public concern.

If licenses are to be issued, cut out the useless examinations and give them to all who can pay the fee. Then in case of accident punish the guilty party, and "let the punishment fit the crime." If the automobile driver is responsible for the accident, not only take away the license but give the culprit a term in prison, and if the accident is due to the negligence of a horse vehicle driver or a pedestrian let him take the same medicine.

This all may seem drastic, but it is just and practical, and is the only way to mitigate the evil.

By itself considered the automobile is the most harmless vehicle or thing that is seen on the highway. A horse may run away or balk; a man may become suddenly insane or become a public menace from

drink; a dog may run amuck; even a chicken taking a dust bath in the road may endanger the public. But an automobile is passive; it does not act, but is acted upon, and the man who knows nothing about it except to start, guide and stop it, is less liable to be a public menace than the one who knows it all.

As a matter of fact everybody who owns or drives an automobile should know all about its construction, operation and care. But these qualities have nothing to do with careless driving, and it is careless driving and only careless driving that makes all the trouble.

The same principles apply as to fixing a definite rate of speed. No limits of this kind can be laid down that will always apply. In fact, it is practically true to say that no serious accidents have ever occurred unless the car was being driven at too great a speed—for that particular place and time. Time and again, however, one may drive faster than the speed allowed by law without the slightest danger or offense to any one; and time and again one may be driving far slower than the speed limit, and an accident may occur for which he is clearly culpable.

Let the statute forbid driving at any speed greater than is reasonable and proper, having regard to the traffic on the highway or street, the time and the place. This, let us hope, would end the court drivel and quibble as to whether a man was speeding a mile or two faster or slower, and turn the matter to the fact of reasonable and proper driving.

Many an innocent and scrupulous driver has been punished because he had been driving a mile or two faster than the law permits, and many a guilty rascal has escaped punishment because he was driving at less than the limit allowed by law.

THE MANUFACTURING TENDENCY.

The recent combination of certain great automobile manufacturing firms into one gigantic organization, with a capital reported to be \$60,000,000, is both interesting and thought-provoking.

Where and how is this tendency or drift of all great industries for concentration to end? Extremes beget extremes; it is impossible for industry to remain for any length of time half competitive and half co-operative. Which is to remain? Is the business individual with small capital to be swallowed up, for better or worse, according as he holds out or quickly enters the protecting fold of the gigantic combination? Or can he by pluck and persistence finally prove his own economic superiority and excuse for existence?

When it has come to a test thus far the combination and massing of gigantic capital has usually wiped out the individual with small capital. But it has not yet been fully demonstrated that this can be done in all cases and with all industries. Indeed, we can see certain advantages for the small firm in the way of supervision, in cutting off petty waste, and in a more distinct and thus to many a more attractive product. On the other hand, great capital has the advantage of enormous output, of specialization of construction, of distribution, and of purchase of raw material, and these are liable to overwhelm the small producer.

Of course this is not a new subject, but the tendency as it relates to the public welfare, is perhaps the most perplexing problem now before statesmen and economists. If this drift of all industry to crystallize and collect about a common center is finally accomplished, how is it to be controlled or supervised for public protection? It is very doubtful that anything thus far enacted or proposed in the shape of an inter-state commerce law or

anti-trust laws is adequate for public protection and industrial freedom.

But all this is another story, as Kipling would say, although a mighty interesting and momentous one.

What we started out to do was to point out for the benefit of automobile owners, users and prospective purchasers, the present situation in the automobile manufacturing line. The \$60,000,000 combination referred to has taken over such substantial and reliable firms as the Cartecar, the Cadillac, the Buick, the Oldsmobile, the Welch-Carter, the Rapid, the Ranier, and some others of less importance. Then we have the Studebakers, the Ford, the Maxwell-Briscoe and a few other gigantic firms with millions upon millions of capital invested. How long it will be before these great organizations, which can undoubtedly supply the market for automobiles, will be obliged to come together for self-protection, no one can foretell.

For the present at all events, this tendency toward concentration on the part of the manufacturing trade, will be a benefit to the automobile purchaser. It will mean better cars, and possibly cheaper cars, if that be possible, and quite as lively consideration of the purchasing public. This will be positively necessary so long as competition exists. But when the manufacturing business becomes thoroughly crystallized, and the small manufacturer joins the combination, or is overwhelmed by it, as he may be—mind, we do not say, will be—the public will probably receive less consideration.

A FAVOR REQUESTED.

For the first time many concerns and companies have been persuaded to try an advertisement in THE AUTOMOBILE DEALER AND REPAIRER. It depends upon our readers whether these advertisements will appear again or not.

We do not expect that any reader, just to please us will make an inquiry about anything he does not want, but we do request that the advertising department be looked over carefully, and ask every one who writes for a circular, or catalogue, or any other information about the things advertised to mention the AUTOMOBILE DEALER AND REPAIRER.

This is the only way the advertiser can know that his announcement is paying him. It is taken for granted that an old journal is a good advertising medium, but a young one is watched with a jealous eye. It must "make good" or get no more business.

We feel confident that our readers will favor us by a careful inspection of the advertisements, and it may be they will thereby benefit themselves, as much as they will us.

This is by far the largest issue of the AUTOMOBILE DEALER AND REPAIRER, not only with respect to pages, but as to the number printed, that has ever been brought out, and we hope it will be found to be the most interesting.

PRICE AND QUALITY.

In a recent interview, Gen. John T. Cutting, president of the Automobile Trade Association of New York, is reported to have said:

"A man pays exactly for what he expects to get. No more, no less. For every dollar that he pays, full automobile value is given. It has to be so, for the public is educated on automobile matters. If a man buys a machine for two or three thousand dollars, he gets so much more quality than if he paid a lower figure. Just as the texture of a suit of clothes is regulated by the purchase price, so it is in the automobile business. If a suit of clothes

cost sixty dollars the buyer gets sixty dollars' worth of apparel. The days when any kind of an automobile could be sold, irrespective of merit, belong to the past, to the period when the industry was undergoing a process of experimentation. To-day an automobile to gain recognition must be built as perfectly as is possible within the bounds of human limitations.

Although the foregoing is near enough to the truth for "practical purposes," yet it is not strictly according to the facts. In the case of some cars far greater value is supplied for a given price than for others. It is a fact, however, that the relations of price and value are nearer parallel than many imagine. If any one imagines that he can get a \$1500 car for \$750, no matter to what manufacturer he goes, he will be mistaken, and the same may be stated if both prices were doubled. Of course, everybody knows that \$60 paid for a suit of clothes does not always bring \$60 value, either in style, quality, material, or in the making.

But the chances are that any man who buys a reputable car of a reputable dealer will get his money's worth. The competition among manufacturers is sharp, and the wonder is that they are able to supply as good a car as they do for the price.

LESSONS FOR DRIVERS.

Carelessness and Ignorance Responsible for Most Accidents.

There is nothing especially new in automobile accidents this month. As usual, a large proportion is due to the same old causes and naturally result in the same amount of death and destruction. In taking a rather close view of accidents as they occur, it is found that more result from skidding and from something going wrong with the steering gear than anything else.

It should be understood, of course, that no accident of serious import would arise from either of these causes excepting that the car were going at great speed. For not only is skidding more liable to occur when a car goes at high speed, but it is far more liable to do damage in such cases, and the same may be said in reference to anything that develops to put the steering gear out of commission.

As to speed, the great majority of drivers hardly estimate the difficulty of averting disaster in case something suddenly appears in the road just ahead. The car which is being driven, without infringing the letter of the law, as to speed, at the rate of only twenty miles an hour, roughly speaking goes ten yards in a second, and, consequently, the driver who comes in sight of an obstacle when it is at a distance of ten yards, approaches two yards nearer to it in every fifth of a second. Under circumstances of this kind, the mind must act with extreme rapidity, and what should be done, must be done quickly.

In driving it must be understood that a road is not artificially kept clear of obstructions like a railway line. Therefore, considering that even though a car driver can see no obstruction on the road, it may meet one at any minute, and should in the event of an obstruction coming into view be able to stop before reaching it. This important rule allows a very high speed on an open road, but necessitates reduction for corners, and at night speed on the open road is practically limited by the power of the headlights, which in the case of the best lamps is about 175 feet. A reduction is necessary for greasy roads in all cases.

In passing small roads running into the main road,

it is quite certain that at whatever speed a car travels a person can always emerge from that road at such a moment as to run into it; therefore speed has nothing to do with liability to accident in such a case, and unless legislation is introduced compelling persons emerging from side roads to do so at a walking pace the danger will remain. For similar reasons drivers should approach blind cross roads at an extremely slow pace. Still it must be remembered that an absolutely literal interpretation of this rule will not always avert disaster, though it may put the onus on the other party.

Meantime the public in New York is being stirred at what it considers the recklessness such as has never been the case before. The newspapers have already begun to treat the matter with "scare headlines." One case in New York City during the past month was especially flagrant. A young woman was dragged along Broadway by a car, while the driver was evidently perfectly aware that he was dashing her helpless frame to death. But he did not stop, having evidently been intent on escaping, and he succeeded. At this writing it is not known whether the young woman will die or not, but if she loses her life it will be nothing less than deliberate murder. It is bad enough to drive cars recklessly in a great city thoroughfare, but the act of running away without seeing what injury has been done to a victim is a crime of the most flagrant kind. Quite likely the law will be changed so that drivers who run away after knocking down a human being will be subject to a long term of imprisonment and this, irrespective of the seriousness of the injury.

Ran Into a Bridge.—Nine young men near Princeton, N. J., struck a bridge while attempting to cross it, and one of them seeing the danger, attempted to jump. He became entangled in the car in some way and sustained such serious injury that he afterwards died.

The Result of a Gasoline Tank Explosion.—In Omaha, Nebraska, six police patrol horses were killed, a policeman dangerously burned and the entire automobile and carriage equipment of the police department practically destroyed by the explosion of a gasoline tank. The catastrophe came with frightful unexpectedness and has cast the entire department in gloom. One of the men was at work half under the rear of the car in the garage getting it in shape for the winter. He had placed the chain and heavy tires on the machine and was at work on the machinery, when in some way the plug fell from the gasoline tank which is carried on the rear of the car. The fumes then ignited from the small light under the water boiler of the steam machinery, and there was an explosion and a terrific billow of flame. Six horses were burned or suffocated and the damage will probably be about \$12,000.

Blinded by the Storm.—In Philadelphia, a touring car crashed into a taxicab in a recent storm. The driver of the car said he was temporarily blinded and both car and taxicab were badly damaged.

A Broken Axle.—A heavy automobile truck in Yonkers, N. Y., was upset while descending a sharp grade by the breaking of the rear axle. The truck and its freight plunged over on the sidewalk, scattering everything in confusion. The driver narrowly escaped being crushed under the machinery.

What a Spark Did.—A car loaded with tires ignited and burned at Indianapolis, Indiana, causing a loss of \$2,000. It appears that something went wrong with

the mechanism of the car, and two young men were preparing to repair it. They opened the body of the machine, and a flooded carburetor and a spark did the rest. As no help was at hand, nothing could be done but watch the machine burn, which it did in short order, with its contents.

Plunged Down an Embankment.—Two men in a touring car in Indianapolis, Indiana, sought to turn out for an approaching ambulance and in doing so lost control of the steering apparatus, and the whole outfit plunged down an embankment. Luckily the soil was soft where they struck and they were not seriously injured. It took two teams of horses and several men to get the wrecked machine back to the road.

A Fatal Leap for Five.—A wedding party of five in an automobile near Cuthbert, Georgia, was dashed from a thirty-foot bridge, three being instantly killed and the other two fatally injured. They were going at the rate of about thirty miles an hour, and while attempting to light a cigarette the chauffeur lost control of his machine, crossed a thirty-foot bridge, and dashed to some railroad tracks below.

While Cranking His Car.—At Easton, Pa., a man was cranking his car, when it suddenly started; pushed him some distance along the road, and finally ran over him, broke his collar bone and otherwise seriously injured him. Strange to say the car was finally stopped by a woman who managed to turn off the power.

A Fatal Cranking Accident.—In Chicago while cranking his car, it started suddenly and knocked the owner down. The wheels passed over his head and fractured his skull. He will probably die.

Steering Gear Snapped.—The other day a chauffeur in Niagara Falls invited a friend to take a spin. They were soon going at a 40-mile clip, and in attempting to steer out of the way of an approaching car, the steering rod snapped. The car struck a telegraph pole, and one of the men was thrown out, crushing his skull and causing his death. The other escaped with a few bruises.

Where Were Their Eyes?—Near Yonkers, N. Y., a woman was walking along when a car shot out of the roadway to the sidewalk while going at full speed. It had got beyond control of the chauffeur. The woman's husband was with her at the time, but escaped injury. She was knocked several yards before she fell and was severely cut on the face, head and body. There were five persons in the automobile, and the only one to pay any attention to the wounded woman or to offer any assistance to her husband in caring for her was the chauffeur, a Frenchman, who would not give his name.

The other four sat calmly in the tonneau without a word or even offering to call a physician. When it was learned that the woman was badly hurt, some one called to the chauffeur and he got into the automobile and backed it off the sidewalk and then the party quickly disappeared down the avenue. Now they are looking for the car for the purpose of bringing suit. But what was the uninjured husband doing all the while? The first thing to do in case of an affair of that kind is to get the number of the car.

Tried to Go to Church.—In Atlanta, Ga., while driving moderately along the street, a woman lost control of her car and with herself, three children and their governess, it plunged from the street and into an excavation of over fifteen feet by the side of the Church of the Immaculate Conception. It was first thought

by onlookers that the entire party had been killed. Many rushed to their aid, and when they had been lifted to the street, it was found that almost by a miracle that the only injury was a small cut under the eye, sustained by the governess. It was afterward learned that the rear wheel of the machine caught in the car tracks, and that the woman in attempting to reverse the power, gave the car an added impetus, which caused the sudden leap.

The Competent Chauffeur.

At the New York School of Automobile Engineers recently, one of the teachers said in a talk to pupils:

"While there are a large number of men who call themselves 'chauffeurs,' and who are advertised in the daily newspapers as 'licensed chauffeurs,' it is still a very difficult matter to secure the services of a man who has the necessary knowledge and experience to take care of an automobile, and one who has at the same time the essential qualities of honesty, trustworthiness and reliability.

"The majority of chauffeurs to-day simply know how to operate machines, but do not possess the necessary knowledge to maintain or take care of them. Fifty per cent. are ignorant of the duties connected with the position of chauffeur and are unacquainted with the rules and regulations incident to the operation of cars through traffic.

"Hundreds of expensive cars have been ruined simply for the want of proper attention, and there are many cases on record where good automobiles have lost their reputation on account of the rough treatment received from incompetent and negligent chauffeurs. They are also responsible for the unnecessary wear and heavy repair bills which have resulted in many cars passing into the second-hand shop. It is a well-known fact that many would-be owners of cars delay their purchases indefinitely, being unwilling to expose themselves and the members of their families to the constant dangers incident to having incompetent chauffeurs in charge of their cars.

"In the case of a chauffeur it is absolutely essential that he should know the makeup of the machine he has in charge. He must know how to adjust his carburetor, time his magneto, locate a missing cylinder, make his tires last a long time, adjust vibrators, time his valves, locate a squeak; in a word, how to put into practice the thousand and one little things which are necessary to the skillful and economical operation of an automobile. When a man has mastered his machine his services are in demand."

Price Cutting of Supplies.

In some localities dealers are complaining about price cutting of supplies, and there is reason for it. The buying public is inclined to think there are bigger profits in the automobile business than is actually the case, and when a dealer for the sake of making a sale, cuts his profit down to the infinitesimal, the buyer does not know but what he is still making a good thing out of it, and naturally thinks the first price was outrageous. Thus is confidence destroyed, even though the sale is made. The dealer, when he goes to the manufacturer, finds a set price, not only for the machine, but for every item of supplies, and whether he buys five or 500, he pays that price. The manufacturer furnishes him a list on which to sell, and in which there is a fair profit only. The dealer who cuts from this is just as foolish, and none can be more so from the standpoint of good salesmanship, as the one who is continually knocking the other fellow's goods.

THE TWO CYCLE ENGINE.

How It Does Its Work and Why It Runs Smoothly and With Little Vibration.

From Dr. R. M. Burney, California.—Can you not give an explanation of the two-cycle engine? That is, how it can do in two strokes that which requires four strokes in the other?

Reply—The modern two-cycle engine combines the suction and compression in one stroke. The impulse stroke also performs the initial compression in the crank case, this compression when transferred into the cylinder at the end of the power-stroke being the means of forcing out the exhaust remaining in the cylinder. All exhaust above atmospheric pressure escapes when the exhaust ports are opened by the piston at the end of the power-stroke. The cycle, involving these four actions, is therefore completed in two strokes of the piston, representing one revolution of the crank-shaft.

There are three kinds of two-cycle engines. First, engines of the Lenoir type. This engine is now obsolete, as it did not compress its charge before ignition and was therefore very inefficient. This engine sucked a charge into the cylinder for one-half of the piston stroke. At this point the charge was ignited and expanded, giving an impulse to the piston in the last half of this stroke. The return stroke forced out the exhaust.

Another kind of two-cycle engine has in addition to the power cylinder another cylinder, used only for taking in and compressing the mixture. This type need not be gone into here because it has never been applied to automobiles to any extent, due to the complication of the extra compressor.

The third type of two-cycle engine and the one most used to-day, especially in automobiles and launches, is the enclosed crank-case type. In this type the charge is sucked into the crank case through a port or valve by the up stroke of the piston. It is partly compressed in the crank case by the return or power stroke of the piston. Near the end of this stroke the piston passes over and opens, first, the exhaust ports, releasing the exhaust above atmospheric pressure, then immediately after opening the inlet or transfer ports. The compressed charge in the crank chamber is then released through these inlet ports into the cylinder, expelling the remaining exhaust. The up stroke of the piston compresses this charge and the ignition occurs near the upper end of this stroke. Seventy-five per cent. of all small, American built motor launches are equipped with this type of two-cycle engine.

Most of the manufacturers of automobiles equip their cars with four-cycle engines, and largely because it is much better known and has been improved and developed to a greater extent than the two-cycle type.

The following are the difficulties to overcome in applying the two-cycle engine to automobiles:

Difficult to obtain a wide and positive regulation of power and speed, especially at very high and low speeds, without missing impulses. To obtain efficient and economical running under all conditions. To obtain proper lubrication. To prevent crank case leakage. To obtain a sufficient amount of power with a reasonable weight. The reversing of the motor. The carbonization in the ports. Carburetor troubles. Back firing in the crank case. Difficulty in adjusting bearings.

There are several cars now on the market, notably the Elmore, which are showing up very favorably with two-cycle engines. It should be added that while it is claimed that the two-cycle engine requires more gasoline for a given amount of efficiency, it should run smoother and it has far fewer parts.

THE REPAIR SHOP

Care for the Hands.

In case of a breakdown on the road, if you wish to maintain respectable looking hands, before starting to work on a piece of greasy machinery, take some cylinder oil and rub it well into the skin. After it is finished, to take the grime off do not rub the hands with waste and work the dirt into the pores but apply fresh cylinder oil, or any light oil, liberally on the hands, using it the same as soap and water. When all of the grease has been cut loose, take a clean piece of waste or rag and wipe off the hands. When you have wiped off the oil you will find most of the grease has gone with it leaving the hands in good shape to wash with soap and water. The soap used in finishing up should be tar soap, and the autoist who tries this system will be greatly surprised at the results obtained. Coal oil, gasolene, and all gritty soaps and compounds should not be used as they harden the skin and make it crack. Especially is this true where it is used several times a day, as in the repair shops.

When out on the road the hands can be made fairly presentable, if no soap can be had, by using the oil wash alone and drying them off thoroughly with waste. Most repair men are well acquainted with the foregoing hand wash, but the man who has had trouble in getting off the heavy black grease which he will get in making repairs and adjustments on his own machine, will find that it will beat anything in the way of gritty soaps and compounds that he ever tried.

Priming for a Start.

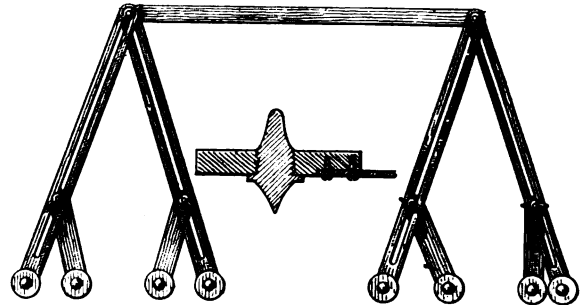
If the motor will not start after a reasonable amount of fuel (it need not be more than a thimble full, or the amount contained in the usual ball end of the priming cock), has been supplied, the remedy is to open the pet cocks and turn the engine over briskly for a few turns with the compression taps open. This allows the engine to draw in enough air to form an explosive mixture. When the sharp hiss that denotes an explosion is heard, the petcocks should be closed and the engine turned over against compression. No priming will start an engine with dirty spark plugs, weak batteries, or other ignition troubles. Flooding the cylinder with gasoline is worse than not supplying enough. It is advised to saturate a bundle of cloth or a sponge with gasoline and place it over the air intake of the carburetor when there is any difficulty in starting, this being even better than priming. Under no consideration should waste be used for this purpose as particles may become detached and be drawn into the manifold or carburetor.

Whom to Blame.

When a magneto fails or needs repair, the maker of it is usually blamed, whereas the culpable party is generally either the user or the maker of the car. The car manufacturer seldom pays the necessary attention to lining up the armature shaft with the magneto driving spindle. He often relies on a very badly made joint—by no means universal—to correct or compensate his own bad fitting. Moreover, he never attempts adequately to protect the magneto, for he knows the maker and not himself is held responsible.

For Transferring Holes.

The sketch shows an appliance for transferring holes already drilled in most any piece of work, to a piece to be bolted to that piece, as, for instance, an exhaust or inlet pipe for a gasoline motor, where a new manifold (flanges blank) is to be fitted. Any one who has tried to place the holes in a blank piece and have them line up correctly, knows what a difficult job it is. This tool when once used, will be used thereafter for so many different uses that it will surprise the user. The operation is simply to place the rounded end of the center punches in the holes all ready drilled. After loosening the thumb nuts let the punches and arms conform to the position of the holes, then tighten the thumb nuts. Then turn the implement upside down, place the end of the punches on the blank face of the piece to be drilled and tap the round end of the



"A useful appliance."

punch with a hammer and the position of the holes is established. It is advisable to punch the two end holes first; that will steady the whole line. The sketch is a sectional view of the construction of the punches, end plate and arms.

Advantage of Large Wheels.

The superiority of large wheels has already been shown in this magazine. But this is the way the Oldsmobile Company expresses it:

"Consider for a moment that a wheel 34 inches in diameter, such as ordinarily used on touring cars, has a circumference of 8.89 feet and that a wheel 42 inches in diameter has the enormous circumference of 11 feet, as compared to 7.86 feet of circumference on a wheel 30 inches in diameter, such as used on runabouts, and it is just here that the wear and tear of a small wheel comes in, whereas on the the big wheel the ultimate saving is apparent. At a speed of twenty miles an hour a 30-inch wheel makes 219.4 revolutions a minute, a 34-inch wheel makes 194.4 revolutions a minute, while the big 42-inch wheel will make only 157.2 a minute. Carrying the comparison further, the extreme limit of sixty miles an hour a 30-inch wheel makes 658 revolutions a minute, a 34-inch wheel makes 483 and the 42-inch wheel only 471, an enormous saving on the wear of the tires.

The foregoing is strictly true, and it only remains necessary to say one word more to complete the story: Large wheels must be far heavier than small ones; it costs more for their construction and the lessened wear of the large tires is only in about the same proportion as their extra cost.

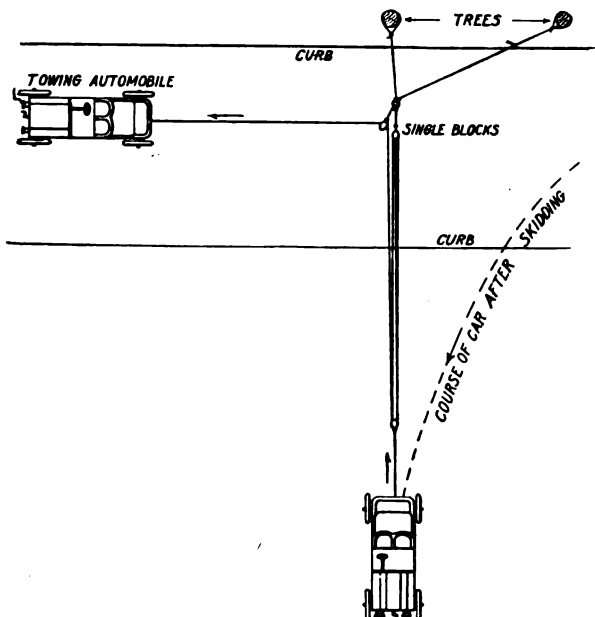
Only Four Problems.

H. C. Brokaw, Principal of the New York West Side Young Men's Christian Association's Automobile School, gave a talk at the opening of the new term of instruction recently. He showed that the operation and care of an automobile is not so formidable as some people think. There are really four problems, gasoline, air, oil and machinery. It is the combination of the three with the machinery that motion is secured. It is very desirable for people to know how every part of the machine is made, but this is not gained except by much study. One must know how to detect when something is wrong, and what is of greater importance, how to remedy the trouble.

Only trained anatomists know about the detailed construction of the body, yet everyone should know in some measure how to use these bodies which are the most wonderful machines in the world. By these precautions the physician is not needed. The automobile, like the body, gives symptoms of trouble, and the operator ought to know at once when something is wrong in order to save the machine and needless expense if allowed to continue. It should be so understood, that its operator can keep it in proper adjustment and condition and run smoothly at its greatest efficiency.

Getting a Car Out of a Ditch.

From A. G. Smith, New York.—The illustration shows where an auto had skidded into a ditch, and as the road or street was too narrow to permit of a straight pull out, a tackle was arranged as the sketch



A towing tackle.

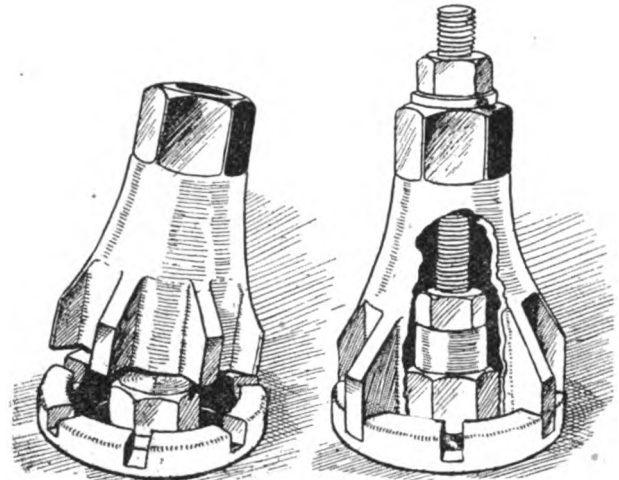
shows, and out it came in a hurry. By placing the double block next to the load as shown, more power can be secured from the same tackle. As the sketch speaks for itself, it needs no further explanation.

Bright Metal.

Quite likely it would not be right to actually hit a man with a stuffed club who makes a car with an abundance of brass parts but it would be about what he deserves. There is work enough on a car to keep it looking tidy even when there are no bright parts to polish but to add to the agony by supplying brass lamps, and other accessories is little short of crime.

Removing Valve Caps.

Occasionally a car will be found which has several indentations in the valve caps. For removing such valves a castellated spanner will be found in the tool kit. The teeth of this fit into the slots in the valve caps, and a spanner is, of course, used to turn the tool. The difficulty is to keep the valve remover in position, for as soon as the spanner is strongly ap-



Showing the Valve Caps.

plied the tendency is for it to lift, as shown in the left-hand illustration. The whole difficulty is due to the castellated spanner lifting up when leverage is applied to it, and it is most difficult to remove the valve cap, owing to this tendency. Obviously the thing to do is to hold down the castellated valve remover so that it cannot tip out of position. To effect this take an old spark plug which fits into the plug holes in each of the valve caps, and screw a bolt into the base of the old plug. This is long enough to project through the top of the castellated spanner, so that a washer and nut can be applied. All that one has to do is to remove the spark plug, or if the car has not two ignitions there is a plug in one cap and a bolt in the other. These are taken out. The old plug is screwed into the hole, the castellated spanner is dropped into position, and then the small nut on the top is screwed down. There is no need to use the spanner, as there is no necessity to screw the adapter into the cap tightly. Indeed, both it and its bolt can be tightened sufficiently by hand. Having done this, the valve cap removing tool and the valve cap are practically one, and a good long spanner can be applied to the castellated tool and the cap removed with the utmost ease. When the valve cap is screwed home tight and has been in position for some time it requires very considerable force to remove it.

Don't Tinker.

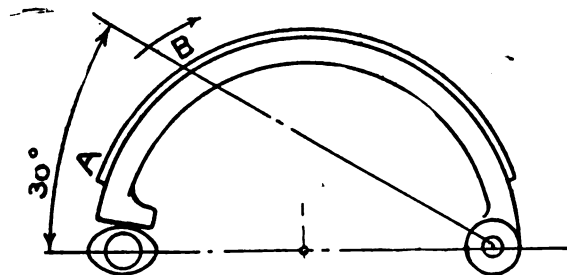
It is a good rule to let well enough alone, and beyond a thorough oiling and looking over not to disturb parts that are working satisfactorily. As a rule, the man who does not know where to look for the carburetor or spark plugs but simply "oils up" and "goes ahead," is the one who gets the most pleasure out of his auto and has the least trouble.

A pound of graphite added to the gear box oil occasionally is recommended; probably every thousand miles, depending on the kind of usage the car gets.

Do not run to the maker for every little strange noise which develops. "Forget it," as these things come and go daily in the use of the automobile.

Vibrating Foot Brakes.

If the foot brake is on the propeller shaft there is a considerable amount of spring between it and the road wheels, and many cars suffer, when the car is nearly stopping, from more or less violent trembling from the foot brake. There are several points to be looked into to improve, if not cure, this. In the very first place, the brake liner friction must commence far enough back on the brake shoe so that the direction of rotation will not tend to pull it on by its own friction; thus, if the direction of rotation on the sketch is clockwise, and the brake liner friction begins right down at A, it will tend to pull the brake on, and sometimes cause it to jump on and off very violently. It is



Why a Brake Vibrates.

much safer to begin at B, or something over thirty degrees from a line drawn through the center of the brake drum. If this, however, has been attended to, and the brake still "shudders," the next easy step is to use some graphite lubricant instead of ordinary oil. Many brakes are made with the friction shoes plugged with graphite in holes of small diameter, and tapered from the inside to the outside so that the graphite plugs cannot fall out. Another remedy that has proved successful is to use a textile brake liner. Sometimes it has been necessary to use the textile brake liner and the graphite as well.

TWO IMPORTANT POINTS.

Speed and Gasoline Consumption and the Arrangement of Cylinders.

From O. H. Hampton, Indiana.—A recent number stated that it took less gasoline to run a car at 25 miles per hour than it did to run it at a slower speed. As the throttle has to be opened wider to make the car run faster, and the motor makes the same number of revolutions per mile regardless of the speed of the car, it seems plain that the higher the speed the more gasoline would be required.

There are several makes of cars that use the "two cylinder opposed" type of motor. Please tell us what objection there would be to placing the cylinders side by side instead of opposed to each other. Placing the cylinders "opposed" makes it a troublesome matter to get at the crank bearings to take up the wear. If the cylinders were placed side by side and the opposite side of the crank case made removable, it would be very easy to get at the crank bearings.

Answer:—Replying to the first question: With the car running in high speed gear at a speed of 25 miles per hour with an engine making 800 revolutions per minute, developing 18 horsepower, then placing the car in low gear and running at 8 1-3 miles per hour, the engine still making 800 revolutions per minute and developing 6 horsepower, it would be plain to be seen that engine is using less gasoline under these conditions assuming that all conditions of road are the same in both instances.

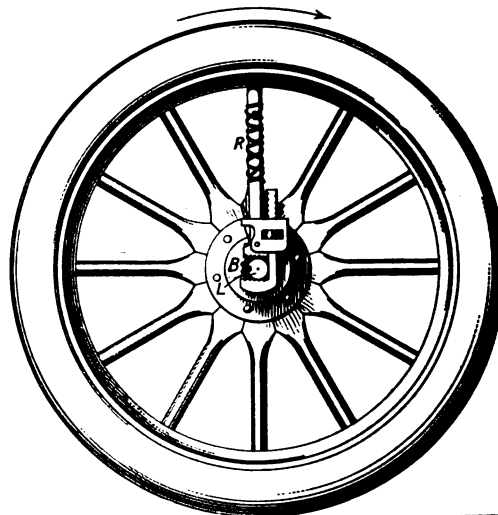
Another instance we might mention would be that

of having the engine working under conditions as mentioned at first. We will now change to low gear and the power required by driving wheels would be increased, say to 45 horsepower, the engine still making 800 revolutions and developing 18 horsepower, while the car would be traveling at a slow rate of speed the engine would be still developing its maximum power and under these conditions the consumption of fuel would be the same.

Replying to the second question: To place two cylinders of a motor side by side instead of opposed would, in the opinion of the writer, be a much better mechanical arrangement, although there are many motors on the market at the present time of the opposed type which are apparently giving perfect satisfaction and are used by many of the well known manufacturers. It is claimed that in placing a two cylinder opposed motor under the body of the car that the vibration would be reduced, but the difference is so slight that it cannot be noticed. If the mechanical end of the engine is perfectly balanced the shock or recoil of the explosion would be the only thing to be contended with, this being taken up between the cylinder head and the main bearings cannot be counter-balanced mechanically in either the opposed type of engine or the other type with the cylinders side by side. The advantages to be gained by placing the cylinders side by side makes a better arrangement for mechanical care and maintenance.

Getting Home In an Emergency.

From A. G. Smith, New York.—Illustrated herewith will be seen how an auto was gotten home on its own power, after the rear hub casting had broken out, leaving no hold for the axle on the hub. A "Stilson" wrench was engaged tight on the axle and bound to



Use of a Stilson wrench.

one of the spokes, thus transmitting power from the axle to the wheel. There was more or less wobbling in the wheel, but it could not get off or loosen the grip of the wrench. One glance at the sketch will convey the idea to most any one, and any one being placed in a similar predicament will be able to get home by utilizing this plan.

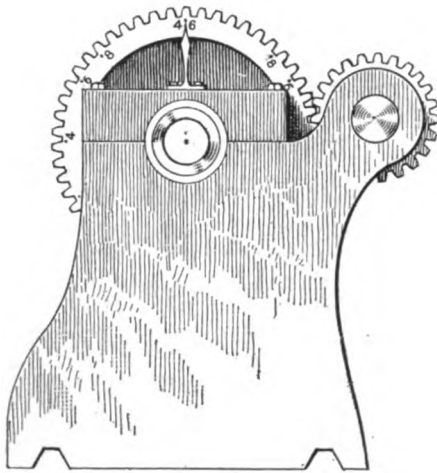
Valve Stems a Bit too Large.

A reader says he recently noticed that his car began to lose power. It also knocked at high speed. This seemed to point to flooding of the carburetor, but no-

thing wrong could be found there. The magneto (Bosch high-tension) was next suspected, then the plugs, but the ignition was quite in order. At last he decided to take the cylinders off and see if they and the pistons were foul and causing pre-ignition, and then the trouble was found. The valve stems had been made a trifle too fine a fit in the guides. A little rubbing with emery paper and all was as it should be, and now all the old power and sweetness is back.

For Nuts or Bolt Heads.

From A. G. Smith, New York.—The sketch is something on the machinery line, but I have personally used it so often to good advantage that no repair shop



A handy device.

will do without it when once put to use. It has so often been necessary to form the head of a bolt or a nut, or, in fact, any part of an automobile which must have a triangle, square, hexagon or octagon shape, or to scribe a piece of round stock for a key seat, that this appliance is a very necessary tool in the repair shop. The idea is simply to lay out in equal divisions, on the face of the large gear on the head stock of a lathe, with a stationary pointer fastened to the cap of the pillow block. The hand pointing to the desired number and the work scribed with the tool in the tool post, puts the marks in the proper place. The idea can be used for a great many different purposes.

Understand the Principles.

A gas engine will work satisfactorily under certain conditions, and under others will not. Hence, if we know what these conditions are in the first place, should the engine show signs of running badly at any time, it becomes a matter of looking around to see what conditions have become altered. This amounts really to simply following the makers' printed instructions intelligently; and little trouble will be encountered when in charge of a gas engine if the general principles upon which it works are clearly understood.

Gasoline for the Tires.

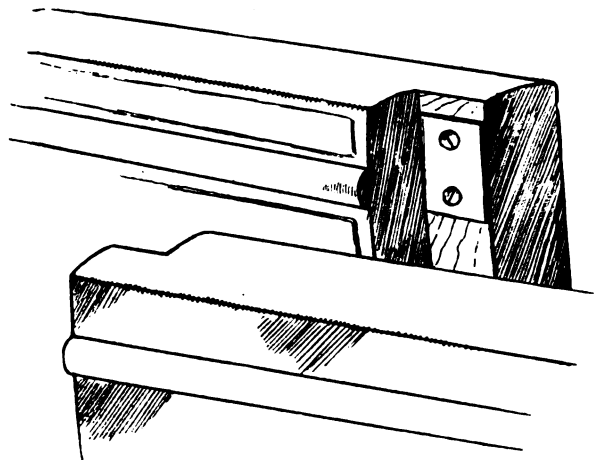
Gasoline will not injure your tire in the slightest. It is factory practice to use raw gasoline to wash the crude rubber and every strip that goes into the construction of a casing first is washed with gasoline to eliminate the dirt. Often the rubber is clean but the tire maker takes no chances, fearing possible dirt from the workmen's hands.

Mysterious Noises.

It is often extremely difficult to locate mysterious noises—knocks, squeaks, rumbles, flutters and whistles. There are still in use many motors which employ wipe contact type of commutators and it is well to look to the wiper blade and the disc on which it rubs for the source of a squeak, if the disc is allowed to get dry by the rubbing of the steel wiper piece on the fiber disc. A drop or two of oil will cure the difficulty. Another point where lack of oil will cause a most disturbing squeak is at the bearing where the shifting yoke collar used in connection with the ordinary cone clutch is located. This is exposed and often neglected, so that it gets dry. A little oil and graphite will prevent recurrence of the trouble, for if the oil is dissipated the graphite will serve as a lubricant. An engine will sometimes develop blowing or whistling noises, which may be due to various causes. These may be caused by a compression relief cock having bolted open, in which case the noise is accompanied by a loss of power. If the sound is like the report of a gun, there may be some leakage in the exhaust system, or the muffler pipe may be defective or loose. In some cases, a whistling is due to the air passing into the carburetor. A broken exhaust manifold gasket, or leaky head packing, will also cause whistling.

For Rattling Doors.

After a car has been in use some time, especially if the body be rather weak, the wood unseasoned, or the frame unduly springy, the doors will rattle. Although the actual play is very small, it makes a most annoying noise, and in these days of quiet engines and quiet transmission body rattles and body squeaks are exceedingly irritating. All that is necessary to stop a rattling door is to get a thin piece of fiber or leather, and fix it on to the door post as shown. Of course, a little judgment is required. One should see that the thickness of the fiber is only infinitesimally greater



than the amount of play in the door, and if the door is loose all the way down another plate should be fitted about an inch or so from the lower end of the door jamb. The sketch shows the idea. It is obviously a makeshift, but there is no other easily applied remedy, as nothing but entirely refitting the doors would stop the looseness, and this would necessitate repainting.

Tire Valve Caps.

Never allow a tire valve to remain uncovered; if the cap be lost, secure by a piece of leather or rag and a rubber band or string round the stem. If dirt is allowed to enter, a leaky valve is bound to result.

TROUBLE DEPARTMENT.

Questions answered by the Y. M. C. A. Automobile School, 322 West 57th St., New York.

This department is intended to be a "trouble clearing house," and it will be esteemed a favor if our readers will add information to it from their own experience or knowledge.

Starting Cold Motors.

From "Kalamazoo," South Dakota.—Referring to the "Trouble Department's" answer to a subscriber who has trouble in starting a single-cylinder Cadillac when the motor is cold, perhaps I can add a few hints that may be not only of service to your inquirer but to others who sometimes find their machines in a similar state of contrariness.

As a general proposition, if there is one thing more uncertain than a gasoline motor it is another gasoline motor. Just when one begins to flatter himself with the notion that he has got one of the things tame enough to come up and eat out of his hand it develops all the meanness in the catalogue and then some. And there is nothing more exasperating on some chilly fall day at a race meet or similar gathering where many machines are lined up to be left solitary and alone breaking your back twisting the crank of an automobile while your friends and acquaintances are speeding homeward one by one. For it is a fact, that many of the old-style single-cylinder machines and not a few of the latest model two-cylinders with horizontal motors under the body will do this very thing for you.

It has been my experience with them and it has also been my experience with the double-opposed motor under the hood that the latter start when cold as easily as any of the highly perfected four-cylinders—in fact, easier than some of them. Just why this is so I have never been able to figure out, as I am at a loss to account for the seeming inability of the manufacturers of several popular types of two-cylinder-under-the-body machines to fit a carburetor that will obviate the difficulty so often experienced in starting them in cold weather. Of course, when the motor is once started it can be stopped and started readily so long as the motor is warm, but many of them cool quickly even in early fall if let stand an hour or two, and then comes the tiresome and exasperating cranking. The fact that an air intake is jacketed so as to give a warm mixture is of no advantage when the motor is cold.

There are several methods of starting a cold motor familiar to all experienced motorists, some of which were given in answer to your correspondent, filling the water system with warm water being one of them. This is only practical of course in starting in the garage. With a troublesome motor of this kind it is a decided advantage to keep the engine clean with frequent applications of kerosene, a few teaspoonfuls in each cylinder just after coming in. This cuts the gum and old oil from the rings and has a tendency to neutralize the moisture that collects on the inside of the cylinders from condensation. It also enables the motorist to get a faster and easier turn on the crank when starting again. The more rapidly the motor is operated the greater the friction and heat and the easier to ignite the explosive mixture.

I have found it an advantage, also, to carry as a reserve set of cells those that are used exclusively for starting, quickly switching to the old set as soon as the motor is running. This gives one a hot spark always, and it will be found that there is a radical difference in attempting to start a balky motor on a set of cells showing 8 to 10 amperes and a set showing from 20 up.

Saturating a bit of waste with gasoline and applying it to

the air intake will usually start the most obstinate motor if everything is in proper order. Some machines have a gauze air intake, over which is drawn a stocking. Squirt-ing a teaspoonful of gasoline either from a can or gun on the stocking answers the same purpose. Most of the modern four-cylinder machines have cylinder primers and all two-cylinders should be so fitted. There is a spark plug made for double-opposed motors fitted with a primer that appears to fill a long-felt want, though I have had no experience with it. As a last resort, a teaspoonful of gasoline in one or more cylinders will do the business.

The motorist troubled with hard starting in cold weather should carry a small can of gasoline and a bit of waste, and if he has one or more sets of cells in good order—as he should have—he will be able to overcome practically the whole difficulty by acting upon the hints herein given.

The Engine Stops.

Question—I see you let us ask questions, so will ask one. I have a Maxwell Model A. Have run it four months, and for the last two weeks it has not been running right. When I put my foot on throttle some times the engine will stop instead of speeding up as it ought to. Then when it does start and I go to change from low to high speed the gasoline will spit back through the carburetor and will stop if I do not pull up low gear or out of gear, and have got to watch and throw it on high gear. when it is going down grade, then when running along some time it will spit back through the carburetor, and it has no speed, not over 15 miles an hour. It has run fine and I have never had any trouble before this, but since this came up I have had two experienced men to look at it and they don't seem to know what the trouble is. We thought there was dirt in the carburetor and we took it off and it is clean: also thought there might be water in the gasoline, but we emptied tank and strained through a chamois. I have changed both my air and gasoline—I mean on the carburetor—and it don't seem to make much difference. My engine does not heat or crack. Would a weak spark cause this? I think my spark is O. K. I would thank you very much to tell me where my trouble is and how to remedy it.

Answer:—Take out your spark plugs and lay them on the cylinders after widening the gap between the points to $\frac{1}{4}$ inch (be careful that only the metal part of the plug which screws in to the cylinder touches it). Turn on the switch, and crank the engine over to see if the spark will jump the gap. If it will not, the trouble is either in the plug itself, the vibrators on the coils or a weak battery. Do you get a good strong hum from the vibrators? Your trouble sounds more like faulty carburetor adjustment, however, and if you have tried adjusting by means of the spray nozzle valve look at the auxiliary air adjustment and see that it has not slipped.

Misses at Grades.

Question:—I am a subscriber and would be glad to have the following answered in the paper: A Midland four cylinder car with a Kingston carburetor runs fine on level roads, never missing at all and has all kinds of power, but will not make heavy grades without missing very badly, and sometimes have had to drop to second gear. Have cleaned spark plugs and carburetor, but the trouble still continues the same as before. The car has a Remy magneto.

Answer:—If the gap in the spark plug is too great, the plug will sometimes misfire when the throttle is wide open. This is due to the fact that when the throttle is at its widest point the compression is greatest and the current from the coil will therefore have the greatest dif-

faculty in jumping the gap. The gap in the plug should not be more than 1-32 of an inch. Your carburetor might not be properly adjusted for a wide open throttle.

Too Much Noise.

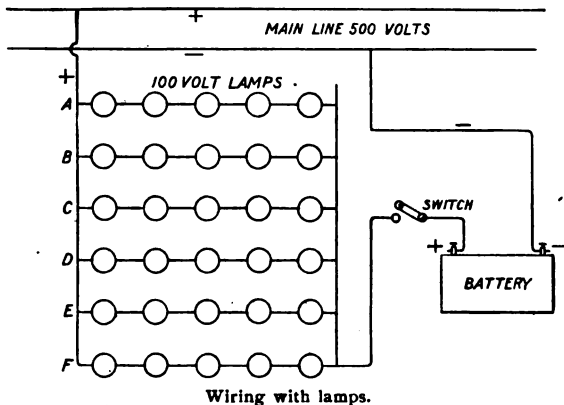
Question:—A year ago I asked you about lengthening out my wheel base, on a two cycle Pope Toledo car. I found your advice good and a great improvement in the car. Now I want to ask you about my two cycle motor; when the car is standing the motor will run hard and make an awful threshing, no especial noise, only just the general noise of a two cycle motor running hard and I can't stop the motor running so hard; if I shut off more gas or retard the spark, it will stop. I am told this is on account of the high compression in the motor. The cylinders have no relief in any way. Would you advise putting in a relief valve in each cylinder? And can I do so successfully, and what size opening should I make? I should like to know about a valveless or noiseless motor and where a person could buy one, but suppose to answer this would be contrary to your rules.

Answer:—Pet cocks to relieve the compression would do very little toward allowing the engine to run at a slower speed and if they did the noise of the escaping gas would fully make up for any other noise overcome. We would hardly advise doing this. The valveless engine you refer to is probably the Knight engine. It has not been put on the market in this country, so far as we know, but it is used on the Daimler car in England, and is said to be satisfactory.

Power From Electric Lamps.

Question:—Can a storage battery be charged from a 500 volt direct current with the use of lamps, and how?

Answer:—A storage battery can be charged from a 500 volt direct current by making connections as per diagram given below. Each set of five lamps will allow 1/2 ampere of current flow, providing they are 16



c.p. 100 volt lamps. If they are 30 c.p. lamps they will allow 1 ampere to flow and so on for different candle powers. The rate of charge should be determined from mark on the battery or from the manufacturer. Referring to the diagram the (x) positive wire from the line should be connected to the positive (x) terminal of the battery and the negative (—) wire to the negative (—) of the battery. If 16 c.p. lamps are used by turning on all lamps of bank A—1/2 ampere will flow. If A and B are turned on 1 ampere will flow and so on. In this way any amperage required may be obtained by using the proper number of lamps.

Tire Blows Out.

Question:—Will you kindly answer through the columns of your paper the following query I am driving a two-cylinder car weighing 2365 lbs., with 32, 3 1/2 tires,

which I have endeavored to keep at 65 lbs. pressure all the time. I have had the misfortune of blowing out six tires this season, the blow-outs occurring just off of the tread. Part of these tires were 1909 make, the first ones being carried over from last season. The car was driven about 1200 to 1500 miles last year and about 4200 miles this year. Can you give me any explanation to the above?

Answer:—Blow-outs in tires that occur just off the tread are quite often caused by ramming the car against the curb so that the rubber is scraped off sufficiently to allow moisture to get in and rot the fabric. It also strains the fabric and weakens it so that it is apt to blow through. The pressure you used should be sufficient, and the size of the tires is right providing the car is not too heavily overloaded. Are you sure the weight of your car is 2365 lbs? They are sometimes heavier than rated. A 32 x 3 1/2 tire should carry 550 lbs. car weight on a five passenger car. Some makes of tires have a habit of blowing out as you describe, and perhaps a change of make will solve your problem; however, keep in mind that any cut in the rubber that goes deep enough to allow moisture to get at the fabric will cause a blow-out sooner or later.

One Cylinder Misses.

Question:—You want your subscribers to ask questions. Here are a few questions that I would give a great deal to have answered:

I have a 1909 Reo Touring Car, two cylinder. The front cylinder misses a great deal. It seems to miss more at times than at others and it misses more when the engine is just running light. As soon as the clutch is engaged it almost quits entirely and sometimes it will run the car for hours without a miss. The coil is all right; the spark plug is all right and the commutator is all right; the compression is as good as any car I ever saw and the valves are all O. K. I have adjusted the carburetor in all the positions possible and still it misses. My connections are all light. It is something out of the ordinary as I have had a Reo expert to work on it and he gave it up.

Answer:—Try your spark plug points with a gap of less than 1-32 of an inch. See that there is very little sparking at the vibrator points on the coil and that they are very smooth and clean on points of contact. Examine the inlet valve stem guide and see that it is not worn so as to admit excessive air to the mixture for that cylinder. Also see that the gasket on the inlet manifold for either cylinder does not leak. The Reo carburetor is adjusted for a very rich mixture at small throttle openings and it is quite possible for one cylinder to get a rich enough mixture to miss fire, especially if the muffler on the inlet of the carburetor is not kept clean. Have you tried opening the auxiliary air valve on the carburetor?

Misfires.

Question:—I have a two-cylinder Maxwell Model A, 1909 runabout, that has developed the habit of misfiring when going at the speed of twenty miles per hour or more. When going along slowly or climbing hills in high speed she is all right. The explosions occur as near as I can tell somewhere in the exhaust pipe before entering the muffler. I have a good ignition system—magneto and batteries—yet she will misfire on one as much as the other. There is good compression in both cylinder. I have cleaned out the carburetor and have set the same in about every different way possible. My wiring is all O. K.; I have had five different kinds of spark plugs—"all new." I have also filed the points of my coil and increased the tension on vibrator. Commutator is O. K. I replaced

the fiber insulators on the arms and I have taken up on the spring, all with no results. Another thing I would ask: What can be used on threads of spark plugs to make them gas tight? I have used both white and red lead, but they still leak compression. Thanking you in advance for answering these questions, I wait with pleasure the next edition of your very interesting journal.

Answer:—Faulty exhaust inlet valve adjustment would cause your trouble. The distance between the valve and the pushrod which operates it should not be over 1-64 of an inch, and all valves should be uniform. Examine cams which operate the valves and see that they have not worked loose and slipped. The ground connections of the timer and battery may not be good. Bring the ground wire of the battery as near to the timer as possible; in fact attach to it if practicable.

Should your spark plugs allow compression to be lost it is very likely due to a bad thread, either in your cylinder or on the spark plug, and no amount of lead or other substance can stop the leak. The only remedy would be in tapping the cylinder and necessitating a larger sized spark plug.

An Offensive Sound.

Question:—Your paper has been of much benefit to me, having found in it everything needed except one thing, that is, please tell me how to get rid of or lessen the sucking sound made by my engine, which is a "Pierce-Racine" two cylinder. The sucking sound I speak of is made by the inrushing air through the Schebler carburetor, without this my car will run as sweetly as any of the high priced cars in town.

Answer:—This trouble has been overcome in other cases by attaching about one foot of large diameter rubber hose to the air inlet of the carburetor, but you may find it necessary to provide a larger carburetor in order to decrease the velocity of the air.

A Cylinder Misses.

Question:—I have a 1906 Buick five-passenger car. When I first start it one of the cylinders misses and also when I shut off the spark and oil and slow down, but it is all right when running fast. It also explodes in the muffler when it misses. Please let me know through your valuable paper.

Answer:—Your trouble probably lies in a leaky gasket between the inlet manifold and the cylinder. Such a leak would cause a motor to get an improper mixture on one cylinder at low speed, but would not affect it when running at a high speed.

Meagre Facts.

Question:—Please tell me how many feet of 5/8-inch tubing with fins on it takes to cool properly (pump being used) a 12 horsepower engine, 4 1/4 x 4 1/4 Beilfuss.

Answer:—There are so many unknown quantities in your question we regret it would be impossible for us to answer it without further information.

For an Obstructed Jet.

Unscrew the top of the induction pipe so that the top of the jet is visible. Take your tire pump, press the nozzle against the top of the jet and blow. The result, of course, is to blow the obstruction back into the carburetor, and this is not a complete cure, as the offending substance remains in the carburetor and may be drawn up again, but anyhow there is a reasonable prospect of getting home without further trouble, when of course the carburetor may be taken down and properly cleaned.

Anti-Freezing Solutions.

Car owners should select the non-freezing solution that seems best suited to the conditions of his own case. A simple and fairly good mixture is made by dissolving in a pail of water as much calcium chloride as the water will take up. This solution should not be used in the cooling system until diluted with an equal bulk of clear water. It will then stand a temperature of less than 20 degrees below zero without freezing. Care should be exercised in being sure that the druggist has supplied slightly alkaline calcium chloride, and not chloride of lime, for the latter will do injury to the cooling system. Before the solution is poured in, it may be tested for acidity by immersing in it a piece of blue litmus paper, such as may be obtained from any druggist. If the paper turns red, there is acid present, which should be neutralized by the addition to the solution of a small amount of slacked lime. All loss from evaporation should be made up by the addition of water only.

Other substances may be used for non-freezing mixtures, such as glycerine, wood alcohol, certain kinds of oil and common salt. The latter, however, is about the least desirable, as it lowers the freezing point but slightly. Glycerine has the disadvantage of attacking rubber connections or packing in the pump if a large amount is used in the solution. A solution of half water and half glycerine will freeze at about 10 degrees below zero.

Wood alcohol has no effect whatever on any part of the cooling system, but evaporates easily, and has a low boiling point. When this solution is being used, the alcohol evaporates much faster than the water, and the solution tends to get weaker. Remember, there is a slight element of danger from fire from the alcohol fumes. A solution of 20 per cent. alcohol in 80 per cent. water will freeze at 5 degrees above zero, a 30 per cent. solution at 9 degrees below zero.

A solution of both glycerine and alcohol in water will practically combine the good qualities of both substances. The glycerine raises the boiling point of the solution considerably, while the amount used is not sufficient to affect any rubber with which it may come in contact. The alcohol and water will evaporate more rapidly than the glycerine, and these ingredients must be renewed oftener. A good way to mix the solution is to take equal part of glycerine and wood alcohol, and add water to the mixture in the proportions giving the desired freezing point according to the following table

Per cent.	Freezing Point.
5.....	28 above zero.
10.....	25 "
15.....	20 "
20.....	15 "
25.....	8 "
30.....	5 below zero.
35.....	15 "

Shoddy Accessories.

The experienced motorist always purchases his accessories from firms of repute. Besides being cheapest in the long run the initial expense is really but little higher. Some time back I bought some high tension wire from a little known firm. The wire looked first class, and as the price was the same as usual, I concluded that it was the genuine article. After a very short time, however, I found that, despite its robust diameter, it possessed very feeble insulating power, and was rapidly rotting. My grumble is that wire is never marked so that the innocent buyer (like myself) can see the name of the actual maker.

CAR BUYING.

A Few More Points on Kind, Quality, Use and Construction.

Sooner or later all who have owned a horse or hired one and a good many who never thought of doing so will be the owner or driver of an automobile. It is, therefore, a good plan for this large body who eventually will either own or hire automobiles to give the subject a thorough investigation, so they may know something about them. Most purchasers fail to give the matter sufficient investigation and observation before they buy a car. They too often depend upon what some one else says, or upon a superficial inquiry or examination, when the matter is one that should call out a good deal of study and inquiry.

Those who intend buying automobiles should first decide and clearly have in mind the sort of service they want to get from it. Then the bank account must be taken into consideration. The statement that a man will get about what he pays for is not exactly true. There are occasions and chances where he may get a good deal more than he pays for, and he is likewise liable to get much less than he pays for. But this largely depends upon himself. Then again, one car will do one sort of work to the utmost satisfaction, while another will be disappointing in the same line of work, but will give satisfaction in some other service. Touring cars and runabouts are used not only for pleasure but by physicians and business men who have to cover a lot of territory in a short time. More and more physicians understand this, and as soon as a medical man is properly convinced of the reliability of a car and of its potential value to him he comes into the market. Physicians ought to be able to select a car at the outset that will meet their needs. But that is not always the case.

In one case four New York physicians bought different cars and models about two years ago, and not one of the four was satisfied. Each one has changed cars recently and now all are satisfied.

The man who is going to buy a car should first determine the number of passengers he will want to carry. Then he should settle upon the place of keeping the machine and the manner of maintaining it. He should decide upon the desirability from his point of view, of running the car himself or keeping a chauffeur. This is an important point, for there are cars that absolutely demand the care of an expert. With other cars the question of running and care is a light one. Then comes the question of what use the purchaser intends to make of his car. Does he want to go on long tours, or does he want a car in which he can take a spin on Sunday or in the evening, with a cruising radius of, say, about a hundred miles from his home as a limit? He should know what grades his car will have to overcome, and plan accordingly in his purchase. He should understand the operating conditions and then insist upon demonstrations over roads and routes selected by him to test the ability of the car to do what he wants. If he wants to use a car only in the good weather months, he may well get one different from those who intend to use a car all the year round. The man who intends to take long trips, in which he will be at the wheel for runs of a hundred or two hundred miles at a stretch, should have his seats so placed that there is room to relieve cramped limbs.

Haste in the purchase of an automobile is poor policy. It leads to a thousand regrets for every mile traveled, and it destroys much of the pleasure of what

should be one of the finest forms of recreation and relaxation. The car itself is not the only thing to be considered in the purchase. Neither is its price. A cheap car may be dear at any price, nor is the most expensive always the cheapest in the long run. There are dear cars and cheap cars which no man should buy, because the firms making them are not fully established. A good many cars are assembled. That is to say, they are not made in their entirety by the manufacturer whose names they bear. But this is not necessarily anything against them.

A firm devoting itself entirely to the making of a single part of one sort or another can supply a dozen manufacturers and reduce the cost of production materially. The assembled car is all right, if it is the product of a reliable manufacturer. But it is a delusion if it consists simply of a prettily painted mass of machinery, hastily put together, of imperfect parts bought cheaply.

The purchaser should always demand adequate demonstration of what any car he is invited to buy is capable of doing. It is by no means a final test, but it is a necessary preliminary one, and the purchaser should see to it that the demonstration is a comprehensive one. He should himself select the route to be followed, covering, if possible, the roads upon which he himself will drive later, or, if he is buying away from home, roads presenting similar problems. It is a good plan to buy in your own territory. Agents, under their contracts, are not supposed to invade other territory, and hard feeling may result from a purchase in a distant field. No matter how good a car may be it requires tuning up, like any other piece of machinery, and trivial mechanical difficulties are likely to crop up at any time requiring slight adjustment. The purchaser is entitled to such adjustments under his guarantee, and he should be able, without great sacrifice of time, to run his car to the dealer from whom he bought it and have such adjustments made. It may take a month for a car to become a smooth and sweetly running machine, and no amount of factory testing, complete though it may be and successful in eliminating any grave structural weakness or faulty assembling, can take the place of actual service under road conditions. There should be a clear understanding on the part of the buyer as to these minor adjustments and he should procure a definite determination of what his guarantee is good for, what it covers and what it leaves uncovered.

Intending purchasers should not forget that two motor bodies may look exactly alike and yet one may cost at least 50 per cent. more than the other—and be fully worth it. The firm that employs cheap and unsuitable material and cheap help can naturally cut prices and yet the difference in quality cannot be detected by the purchasers when the car comes from the factory. Wood, locks, hinges, handles, beading, and the various accessories vary in price, according to quality, the difference being scarcely perceptible until after they have been some time in use.

Painting can, with the advance chemical knowledge, show as great a difference in cost. Colors such as vermilion have substitutes at one-third the price, which fade sooner. As the panels are absorbent, it is necessary to apply some half-dozen coats of paint, called filling, to close the grain, especially on white wood—a kind of poplar which is quite porous. The painting on the cheap bodies is completed by a quick drying method, which gives at first most brilliant results; but these are not so lasting as the slower method properly employed.

The upholstery or trimming comes under the same

rule. Enamel, hides and cloth for the backs and cushions, lace for finishing, carpet, silk for curtains, and hair for stuffing cushions, all can bear their proportion of the twenty-five per cent. to fifty per cent. difference in price.

With regard to labor, the special skill required by the expert body maker and smith also applies to the painter and trimmer.

A passing consideration of the points mentioned is sufficient to show where the difference in price is obtained. The purchaser who pays a low price may get good value for his money, but nothing more, and is certain to be disappointed if he expected more, whereas it is evident that by the employment of the best selected materials and skilled workmanship a more durable and satisfactory article will be obtained. Inferior work and materials are only to be detected after use. Under skilful management they may often look better for a time than articles in which good materials and workmanship are used; but it is after use that noisy doors and window frames, joints of framework bulging out, split panels, general dowdiness of painting and upholstery, and an air of having seen better days begin to appear.

In slipshod work, even though the timber is good and properly cured, the framing is of the worst kind. The ends of each piece are cut off true and glued and screwed together. The sides and seat boards, which in such bodies form the superstructure, are cut out of solid whitewood boards, and battens—not framed in or protected by white lead or even glue—are screwed on to prevent warping, entirely forgetting that these battens would give valuable help in resisting strains if properly fixed to the framework as well as the sides. The shuts of the doors, on the plan of those known to the carpenter, are run straight through, no raised bearing pieces at top and bottom being left to prevent noise and give draw to the bolt of the lock, without which no door could be noiseless. Hinges, locks, etc., are fitted with the same want of experience, the result of which will be shown later on.

Instead of boxing out the framework to receive the panels in the grooves, the panels, without canvas, are nailed to the frame, no attempt being made to keep them against the battens intended for their support; blocks are not glued to hold batten and panel together, or blocks to hold in form or prevent vibration of the exposed inside portion of the panel or roof boards. The mouldings, such as used for cheap picture frames, without white lead or glue backing, are nailed on; the joints are then cleaned off, the whole sandpapered, and after all you do get a clean-looking body. Beautiful to the eye of the amateur constructor but a curse to the owner.

The car being frequently covered in mud, the moisture works in behind the mouldings and joints, causing the glue to dissolve and the wood to swell, bulging out the joints, causing the pillars to swell, preventing doors from opening, and glass frames from working smoothly. There is no real cure for these evils; the joints must be planed true again, and woodwork where it binds cut away, thus removing strength from the framework, which soon shows signs of collapse.

The occupant of a closed vehicle is practically sitting inside a drum, and if the precautions previously named are not carefully watched, he will find that the faster his car travels, the vibration set up will beat a devil's tattoo in the panels, to the accompaniment of rattle of doors and glass frames, and the squeaking and groaning of all the infernal instruments ever invented to drive a man or woman mad.

As to the painting of a car body, it is not solely for decorative purposes, but to preserve it from the effects of the weather. It is important that the care and expense entailed in the construction of the body should not be thrown away by the employment of inferior or insufficient painting material, and when it is considered that timber is more or less porous, and will suck in the liquid (oil) portions of the paint until the pores are filled, it will at once be seen that a large number of coats of color and varnish will be necessary to produce the mirror-like finished surface. The usual method of obtaining this is to first give the whole of the inside of the body one or two coats of good oil color to preserve it from the moisture that is attracted by the upholstery of the interior. Then the whole of the outside panels receive three coats of lead color mixed with raw linseed oil, and the pinholes and any other small places are stopped up with white lead and gold size. Then six coats of "filling"—a thick heavy paint intended to form the finishing surface—which, when thoroughly dry, is reduced to a perfectly level surface with pumice stone and water, and we have then a good surface ready for laying the finishing color. As the filling may, however, be slightly porous, another coat of dark lead color mixed with oil is applied, and when dry faced down with pumice stone and water. The panels will then receive, according to the nature of the work, four or five coats of preparation, finishing, and varnish color, the black panels japanned, followed by three or four coats of varnish, each of these coats, except the last, being carefully flatted with finely ground pumice dust and water. This last, or finishing, coat is specially made of durable and brilliant quality to stand the rough usage of the road.

All the operations must be carried out in carefully warmed shops or there will be trouble, as only an experienced coach painter can tell the tricks the atmosphere will play with the varnish, sometimes necessitating most of the work being done over again, but with proper men, material, and conditions this does not often happen, and in the end you have a perfect and durable piece of work.

On the other hand a piece of work can be made to look quite as well by the application of one-third less the number of coats of color and varnish, the former being so mixed that it will resist absorption for a time and enable the varnish to hold brilliantly for a time, but will soon become dull and lustreless. The varnish being made to dry quickly has not the requisite body to stand the weather such as the greater number of more durable and expensive varnishes will do. Having received a fewer number of coats, naturally fewer number of hours of labor will be required.

The difference in the cost of upholstery is to some extent found in the workmanship, although the principal cost is in material. In the former the purchaser is more able to criticise details, but in the latter only an expert could tell the difference in quality between a West of England cloth and a shoddy one at half the price; between horsehair for stuffing cushion backs, and old stuff redressed. Carpet, leather, lace, plated fittings, lamps, all in varying proportion, will tell their own tale as soon as the other parts already mentioned.

Practically the same thing applies to the chassis—material, construction and engineering work.

What is not in the engine can not come out of it, surely.

ENGINE TROUBLES.

These Are Not All But They Are the Most Common and Troublesome.

Engine firing irregularly may be caused by:

Broken down insulation on wires. Carburetor not properly adjusted, causing poor mix. Cracked spark plug. A defective connection at some part of the circuit. Gasoline feed partly choked. Moisture on spark plugs or water in oil case. Poor contact in timer. Spark coil not properly adjusted. Terminals on coil may be loose or damaged.

Engine emits hissing sound may be caused by:

Broken spark plug. Cracked exhaust pipe. Loose union where exhaust pipe connects with muffler. Open compression tap.

Engines fires regularly but is weak may be caused by:

Compensating valve on carburetor not working. Improper gas mixture. Insufficient lubrication. Platinum contacts on coil may need cleaning. Poor compression caused by loose plugs or valves. Reduced lift on exhaust valve. Muffler outlets may be stopped with mud or charred oil. Vibrator on coil may need adjusting. Weak spring on inlet valve.

Engine weak and crank case hot may be caused by:

Crack in piston head. Leak of burned gas past piston rings which may have become worn or broken.

Engine refuses to start may be caused by

Broken or jammed gears. Dry cylinders. Battery plug not in position. Fouled or cracked spark plug. Gasoline shut off. Improper gas mixture. Improper ignition. Inlet valve stuck. Open battery switch. Poor compression. Water in cylinder caused by leak from water jacket. Water in gasoline.

Engine runs properly but car drags may be caused by:

Clutch slipping. Dry or worn clutch leathers—may need renewing. Weak clutch springs. Brakes not completely released.

Engine stops suddenly may be caused by:

Broken spark plug. Disconnected electric circuit. Loose terminal. No gasoline. Vibrator on spark coil stuck. Trouble at timer. Broken wire.

Gradual slowing up with misfiring may be caused by:

Carburetor may be choked up with dirt at jet. Gasoline tank empty or air bound. Gasoline valve partly closed. Fouled spark plugs, due to over or poor lubrication.

Explosion in silencer may be caused by:

Cylinder missing fire and pumping explosive charges into muffler, which ignite from heat of next exhausted charge. Exhaust valve stuck or does not seat properly. Gas mixture too weak to fire in cylinder. Inefficient spark. Over-retarded spark.

Knocking in Engine may be caused by:

Defective lubrication. Fly wheel loose on shaft. Loose cylinder on crank case, due to nuts slacking off. Loose or worn bearings. Pre-ignition, due to carbon deposit. Spark too far advanced. Too rich mixture.

Exhaust pipe becomes red-hot may be caused by:

Clogged silencer. Driving with exhaust throttled. Driving with retarded spark. Using low gear too much.

Explosions in carburetor or inlet pipe may be caused by:

Defective inlet valve spring. Inlet valve not closing properly. Leaking valves. Lean gas mixture. Spark too far retarded. Valves incorrectly timed.

Squeaks and their probable causes.

Brakes may be partly set. Lack of proper lubrication at friction surfaces.

Water in radiator boiling causing overheating, may be caused by:

Clogged radiator tubes. Clogged silencer. Defective

pump. Defective water circulation. Fan not working. Incorrect timing of valves. Over-retarded spark. Throttled exhaust. Using low gear continuously on long drive.

PNEUMATIC OR SOLID.

Why the Tire Filled With Air Rides So Easily and There Is No Substitute.

It may as well be thoroughly understood first as last that nothing ever will or can take the place of the pneumatic tire for resiliency, for lightness and for ease of propulsion. If any one makes contrary claims you need not dispute him—for disputations are not profitable—but simply let it go that he does not know what he is talking about. No spring wheel, no cushion tire, no tire of any kind is equal to the pneumatic tire in lightness, in easy riding and in easy propulsion.

As to durability and cost—that is another tire yields to obstacle, such as a stone, and indents the tire without cutting it, no shock is given the car in passing over it, unless the tire is very highly inflated, or the object is of considerable size. When a solid tire passes over a stone or small obstacle, instead of indenting and receiving the stone in the tire, it raises the wheel from the ground, a cut may result and the occupants of the car and mechanism receive the jar. By the use of pneumatics there is also an advantage in traction, a gain of 8 to 12 per cent. in economy of power, and 6 to 7 per cent. gain in speed by actual tests, and the latter gain increases with speed.

The solid tire is hardly fit for use on pleasure cars at greater speed than 15 miles an hour over ordinary roads and 25 miles an hour over very smooth roads, while the pneumatic is suitable for any speed on smooth roads and high speeds can even be attained over ordinary roads. An air-filled tire lessens the power required to propel the car. As an example try and push a car by hand that is equipped with solid tires and then one with pneumatics and you will find the car equipped with the solid tire moves harder than the one with pneumatics.

The pneumatic adds longevity to the mechanism, reduces repairs, besides being shock and jar absorbing and neutralizes the noise and vibration of the engine. That the pneumatic tire costs much more for upkeep goes without saying.

But it can be easily demonstrated that the pneumatic tire has advantages over the solid tire, that are too great to be overlooked; the pneumatic tire rides easier, and transmits less of the road shocks and vibration to the mechanism to the car, adding to the life of the same a considerable degree. The pneumatic tire is resilient and yielding and the solid tire is not. Thus small obstacles in the road are absorbed; that is, the pneumatic will never be dispersed. Its only disadvantage is liability to puncture. The longer life of the solid tire is more than compensated for, in the case of fast speed and rough roads by the saving of wear and tear on the mechanism and lessened repairs by the use of the pneumatic, besides the more pleasurable riding qualities. The solid tire is to be preferred, however, on delivery wagons and trucks, as well as high-wheeled buggy type of cars. Both types of tires have their useful field and cannot be supplanted by anything else thus far devised.

A Repainting Pointer.

In having the body and chassis of a car repainted, see that all exposed oil holes are stuffed with felt or waste to prevent them becoming choked. Failure to observe this precaution will result in their becoming clogged with paint which, if not removed before the car is placed in commission, will prevent oil reaching the bearings.

IGNITION.

Make and Break a Jump Spark Again Discussed by An Authority.

In a recent address on Ignition, J. C. Williams, of the K-W Ignition Co., said:

"The make and break type of ignition is more commonly used on large and slower running engines, while the jump spark type of ignition is more applicable to smaller powered, higher velocity engines. The reason for this is, that the proper mechanical circuit breaking mechanism to operate the igniter points for make and break ignition is extremely difficult to make of sufficiently small size and light weight so as to render it positive in its action at very high speeds. The jump spark system of ignition is capable of being successfully operated at very high speeds, as the problems in it are more of an electrical than a mechanical nature.

The make and break system of ignition is complicated mechanically but simple electrically and the jump spark system simple mechanically, but complicated electrically.

"As to the virtue of either system, both are good, and as far as I have ever been able to ascertain, equally good, provided, that the apparatus and mechanism employed are of a substantial and satisfactory nature. In either system of electric ignition, the two most important factors to be constantly borne in mind, are first, the creation of a spark that is intensely hot, second, the proper timing of the spark.

The timing of the spark in a gas or gasoline engine is just as important as the proper setting of the valves in a steam engine.

"On make and break ignition the spark which is created is composed of what is termed dynamic electricity, the meat value of which is estimated by multiplying the voltage across the terminals of the arc or spark by the volume of amperes of current flowing through the spark. The product is the heat units expressed in watts.

"Now this same law applies to the estimation of the heat units of the jump spark, provided that the jump spark is composed of dynamic instead of static electricity.

"Many sparks that are used in jump spark work are static instead of dynamic. The static spark looks white and makes a snappy sound, but will only indifferently ignite the charge in the engine, whereas a jump spark that is composed of dynamic electricity, has a reddish appearance and does not have a snappy sound and is intensely hot.

"The spark coils that produce either a dynamic jump spark or a static jump spark, look just alike, but the defects in a spark coil which make it produce a static spark are first, that its windings are improperly proportioned to each other, and to its condenser capacity.

"No doubt when a good make and break spark is compared with a poor or static jump spark, the evidence is all in favor of the make and break spark, but in reality if a good hot, dynamic current, jump spark, is compared with the same character of current in a make and break spark, there will be found no difference in the power developed by the engine with either of the two systems of ignition.

"The power given to the engine therefore does not depend upon what system of electric ignition it has, but does depend entirely upon whether dynamic or static current is used in the spark.

"In make and break ignition there is no way to make a static spark, consequently all of the sparks are dynamic, but on jump spark ignition with poor quality and

cheaply constructed spark coils the sparks are to a large extent static and consequently very low in heat units.

"The timing of the spark should be so arranged with reference to the position of the piston or crank, that the engine will receive the full force of the explosion at exactly its dead center position or immediately thereafter, as in this position the mixture is at its highest point of compression, and occupies the smallest space. The spark, however, should occur in the cylinder slightly before the dead center position, the amount in advance of the dead center position depending upon the character of the mixture and the heat of the spark. For instance, take a mixture that is either of an improper proportion or that is poorly mixed, and it will require more spark advance than a poor mixture, or a weak spark will require considerably more spark advance to light any mixture than will a hot spark. This lighting of the mixture in advance of the dead center position creates a false compression and a back pressure against the forward direction of the engine, and therefore causes a considerable loss of power in the engine.

"This is one reason why a real, hot spark gives to an engine more power than a weak spark, and is the principal reason, for the hot spark does not start combustion of the charge until the compression stroke is very nearly or entirely completed and it propagates ignition through the charge much more rapidly, which has the effect of burning all the gas, thus creating complete combustion when the gas is compressed in its smallest volume, consequently raising it to a higher temperature, giving a greater thrust to the piston of the engine and maintaining its thrust at greater pressure throughout the entire power stroke.

"In multiple cylinder gas engines the timing of the spark of the different cylinders must be exact. In other words, the spark must occur at exactly the same point on the crank shaft circle for every cylinder.

"With make and break ignition on multiple cylinder engines, it is rather hard to maintain exact timing, owing to the wearing of the igniter points and circuit breaking mechanism. With jump spark ignition where the timer segments are equally spaced and where a master vibrator is employed to break the circuit for all the coils which spark all of the cylinders, no such difference is encountered.

"There are two sources of electric current for ignition. One is the magnetic, which generates a current by mechanical means, the other is a battery, either dry or wet storage, which generates current by chemical means.

"There are three types of magneto ignition. The most recent type is the inductor type of magneto, which has no moving wires, commutators or brushes and which generates a wave of alternating current. The second type is a dynamo type of magneto which has a commutator and brushes and a little drum wound armature and which has a permanent magnetic field. This type of magneto is merely a dynamo with permanent magnets instead of electro magnets for its field. The third type of magneto, is an alternating current magneto, which is equipped with its own circuit breaker and distributor, and which is commonly called a high tension magneto. This type of magneto is also often made with a circuit breaker and distributor and a primary winding on it, which operates on a coil, external to the magneto. It is a low tension magneto, but is also frequently called a high tension magneto, on account of its producing jump spark.

"The magneto system of ignition is, of course, more expensive in first cost, but if a properly designed

and constructed magneto is used, there is no appreciable maintenance charge on the ignition system.

If batteries are used, while the first cost of the installation is lower, the maintenance charge begins with the starting up of the engine and never stops as long as the engine is in use.

On make and break ignition there is a decided reason for using magneto ignition over battery ignition, for with a properly designed and constructed magneto, the igniter points in the cylinder of the engine last indefinitely, and they can be made of very cheap material, such as steel, or German silver, for the voltage which the magneto delivers is sufficiently high to overcome any ordinary resistance, such as oxidized or dirty points, whereas the ordinary battery which only delivers from four to six volts for make and break ignition, requires clean contact points, and of a metal which will not oxidize, for if the resistance of the points is too high, there is not sufficient voltage in the battery to charge the coil.

"The dynamo type of magneto which has a commutator and brushes and governor and which operates through means of the ordinary kick coil just as batteries do, is no better in this respect, than batteries.

The proper type of magneto to use for make and break ignition is the inductor type of magneto which requires no coil of any kind, as the winding on the magneto itself, acts as a kick coil so that when the circuit is broken the voltage across the igniter points will range very close to seven hundred volts, more or less, according to winding of the magneto, and its speed, although the amperage of volume of current will be comparatively small.

"With battery or ordinary dynamo type magneto the first voltage, that is, that used in charging the primary or kick coil, is necessarily extremely low, from four to six volts, and voltage across the points when they break is about 60 volts. Now assuming that both sparks have the same amount of energy, the one from battery or dynamo type of magneto would have ten times the current and ten times the destructive effect upon the igniter points of the engine, than would the inductor type of magneto. It is not voltage that burns out points, but it is the amperage or volume of current.

"The inductor type magnetos that I am most familiar with have a primary or first voltage of about 70 volts, which is ample to go through any set of igniter points, no matter how burned, pitted or oxidized they may be, and as this is multiplied about ten times, by the breaking apart of the igniter points, there is about 700 volts with a consequently small amount of amperage thrown across the igniter points as they separate.

"An additional advantage of the inductor type of magneto over the dynamo type for make and break ignition is, that, the inductor type can be positively gear driven at crank shaft speed for engines of one, two and four cylinders.

"The inductor type magneto has the further advantage of passing current through the igniter points in a very much smaller interval of time than a battery or dynamo type of magneto can charge a primary coil, therefore, the circuit breaking mechanism on the engine can be so constructed as to close the circuit for a very small interval of time, thereby taking up a lot of the lag in the circuit breaking mechanism.

"Now when using a primary or kick coil with battery or dynamo type magneto, it takes such a long time for the primary coil to become charged with current that the circuit breaking mechanism on the engine has to keep the contact points together for a considerable period of time in order to charge the coil, and then

when the tripping mechanism operates, the circuit breaker has to swing through a long arc of its travel before it breaks the contacts apart, thus causing a considerable lag to the circuit breaker.

"The inductor magneto permits of the use of a circuit breaker for make and break spark which will operate the engine at engine speed fully as high as any jump spark system could operate under.

"There are quite a few automobile and motor boat engines in use that employ the inductor type of magneto and a specially made, rapidly acting, circuit breaking mechanism, and they get just as good results from make and break ignition as could be obtained from jump spark ignition.

"Speaking of jump spark ignition the most important factor in the apparatus is the spark coil. The spark coil looks like a very simple piece of apparatus but there is enough electrical science employed in the construction of a first-class spark coil to fill volumes in describing it.

"All that we can say about it here is that it must be so designed and built as to produce a dynamic instead of a static spark. Soft platinum points should not be used, but an alloy of such a percentage of iridium and platinum as will permit a very hard and dense point and one which will not weld itself together as soon as it warms up. It must be borne in mind that pure platinum is a very soft, and spongy metal, and will weld together at temperatures extremely low for welding heat.

"Iridio-platinum contact points require a very much higher temperature before they will weld or seize together.

"In the construction of spark coils the very best of insulating material should be employed, and after the windings are made, they should be pumped out in a hot vacuum, thus exhausting all of the air and moisture and they should then be impregnated while under vacuum with a dielectric of heat and moisture resisting qualities, which would seal up the windings, making them impervious to moisture and preventing all electrical discharges and leakage between its turns and layers.

"This method of treating spark coils is quite recent, and is by no means as yet universal among the various spark coil builders. If spark coils were all built properly with the proper kind of vibrators used, and the coils used in connection with the proper kind of timers, that is, timers which do not have an unnecessarily long period of contact, it would be found that the battery consumption could be reduced very materially.

"Many people seemed inclined to blame their batteries for all of their troubles, whereas if the truth was known, the fault, in a great many instances, would be found in the quality of the spark coil that was used and not in the batteries.

"As to the source of current for jump spark ignition there are two kinds of magnetos which may be employed, also battery ignition can be employed. The dynamo type of magneto with commutator and brushes and governors is no better, so far as the power given to the engine is concerned than are batteries.

"The inductor type alternating current magneto, the voltage of which increases directly as the engine speed increases, gives a much hotter spark at normal rates of engine speed than either the dynamo type of magneto with governor, and which has a fixed voltage, owing to its having a fixed speed controlled by governor, or a battery, which we know has a fixed and non-increasable voltage.

"The reason that increased voltage is required as the engine increases in speed is because the timer con-

tact points in passing over each other rapidly, do not come into as intimate electrical contact with each other, as when the engine is running slow, consequently the resistance of the timer increases directly in proportion to the speed of the engine, and as the voltage of battery or dynamo type magneto does not increase to meet this increased resistance of the timer, the battery, or dynamo type magneto spark consequently gets weaker as the engine speeds up on account of this added resistance to the primary circuit.

"It is therefore evident that a source of electrical current, the voltage of which can be increased automatically as the engine increases in speed, is the best source of current for operating a jump spark system of ignition which employs the ordinary timer and vibrating coil."

CARBURETOR POPPING.

The Varied Causes and the Remedy for a Frequent Annoyance.

It must not be supposed that without seeing the car or running it that an expert can tell what may cause a popping in the carburetor, but he can easily tell what are the most important factors which bring about that annoyance. Here they are: Weak mixture, sticking inlet valves, retarded ignition, short circuit in commutator, distributor, or wiring, or carbon deposit inside the cylinders. Now suppose we take up each of these causes in turn and show how to avoid them.

WEAK MIXTURE.

Exactly why a weak mixture causes popping in the carburetor is somewhat in the nature of a problem, upon which I do not intend to discourse at this moment, but it is a very frequent cause without doubt. To test whether this is the reason of your trouble you can quite easily try the effect of less air if your air control be provided with hand adjustment, and if your engine have an automatic air supply—auxiliary or otherwise—it may be merely a matter of increasing the tension of the spring to make an experiment in this direction.

But perhaps the automatic device on your carburetor is designed to take, and is fitted with, some type of dash pot to make it more gradual and even in working, and may require a new rubber diaphragm, for if the rubber be torn or punctured the sliding sleeve regulating the air supply will work too freely and open wide immediately the throttle is opened.

Again, there are some carburetors which have dash pots of the type where a small cylinder with a spring-recalled piston is used. It is a distinct advantage with this type to charge the cylinder with a solution of glycerine and water in about equal proportions, for, although when this fitment is new the air therein acts as a satisfactory buffer, a very small amount of wear will allow the air to pass the piston too freely—it will lose compression, as it were—but by charging the cylinder with glycerine and water the beneficial effects of the dash pot can be regained.

Another possible reason for the excessively weak mixture which brings about popping in the carburetor is an intermittently choked gasoline supply. Now, suppose you manage to stop this annoying defect of popping by some adjustment of the air supply merely, but that when all is well you find that a considerable variation has been necessary to secure the desired effect. If this be so, your suspicions should be aroused, for you may have missed the cause of the trouble—the reduction of the air supply may be only a palliative, and it should not be necessary in the natural course of

things to suddenly make this large reduction. The probability is that either your gasoline supply is choked somewhere—perhaps the jet is partially blocked—or else your induction pipe is leaking; a joint has given out or become loose perhaps. Do not calmly submit to a largely reduced air supply without searching for the reason why.

STICKING INLET VALVES.

This is the most usual cause to which popping is ascribed. To some folks "popping in the carburetor" and "sticking inlet valve" might be synonymous, judging by the readiness with which they ascribe the one to the other. But the cause referred to is a very frequent one undoubtedly. Removing the valves and cleaning them is, of course, the obvious remedy, but do not be satisfied with merely cleaning the valves (clean the guides, too, by the way), but closely examine the portion of the stem which works in the guides, looking for any signs of seizing or tearing at this point. In the process of cleaning and refitting the valves, too, do not omit to examine the springs, for if one of these be unduly weak, or broken, this might be the cause of your trouble. Also look at the seating for any grit embedded there which would prevent the valve seating properly.

RETARDED IGNITION.

The reason why this will sometimes cause popping in the carburetor is not that the ignition is so far retarded that the spark actually takes place when the inlet valve is open—for, that would mean a complete revolution of the engine after the normal point—but that it occurs some considerable way down the firing stroke, when compression has been relieved very considerably. In consequence of this low compression when ignition actually begins, it follows that combustion of the gases will be comparatively very much slower than usual; in fact, when the exhaust valve opens, combustion will have only just begun, and will be proceeding during the whole of the exhaust stroke, the gases igniting while passing out of the cylinder practically. Following this, it is quite reasonable to imagine that when the inlet valve opens, the gases would be in a state of combustion; these would ignite the incoming charge, causing a fire-back into the carburetor.

This cause is more likely to be the reason of popping if the ignition should be retarded while the engine is running at fairly high speeds, and in that case all that is necessary to stop the trouble is to refrain from retarding so far at these high speeds, but it may also be the cause of such a happening if it occur while the engine is turning comparatively slowly—with the car at rest we will say. If so, it goes to show either that the ignition is "timed" too slow, i.e., late, at the timing wheels, or else that the contact breaker has too wide a range of movement. In the former event it will be well to alter the teeth of the timing wheels, giving more "advance" (but be sure that these wheels affect the ignition only, and not one of the camshafts as well), for the probability is that this is wanted to obtain full power at high speeds. But if it be simply a matter of the contact breaker having too wide a range, the remedy is surely obvious, that is, do not use the whole of the retarding movement available; fix a "stop" at some point, or make a mark somewhere, to show how far the ignition lever may be set back without causing pops.

SHORT CIRCUIT.

This possible cause I need not dwell upon, but merely point out that a "short" at any point of the

ignition circuit, causing a spark to take place in any cylinder on the induction stroke, will, of course, encourage a fire-back. A "leak" at the high tension distributor of a magneto is one point to examine if it be suspected or possible that a "short" may be causing the annoyance.

FOUL CYLINDERS OR PISTON HEADS.

A thick deposit inside the cylinders at any point retains the heat generated by combustion, or rather some of it, and any prominent little piece—perhaps only half the size of a pin's head—may occasionally be at incandescent heat when the inlet valve of that cylinder opens, and thus ignite the gases as they enter. Pre-ignition resulting in knocking, as from an excessively advanced spark, also arises from the same cause, the heat of the deposit then being insufficient to fire the incoming charge at atmospheric pressure, but sufficient to do so when that same charge is more or less under compression—at, say, half-way up the following compression stroke.

Just a word of warning to conclude. Do not confuse a fire-back or "pop" in the carburetor with an explosion or "bang" in the exhaust. You may perhaps say that I need not warn you on such an obvious point as this, but it is a fact that I have on occasions found car drivers confusing the two, especially, I admit, in regard to mistaking the former for the latter. And this notwithstanding that most elementary reasoning would show that the one takes effect under the bonnet and the other in the muffler.

Hints for the Amateur.

When cleaning the metal parts of the automobile kerosene should be used to cut the grease in preference to gasoline as it is not so liable to explode when used near a torch or other fire. It is well to dry the kerosene off the metal after it is clean with a dry cloth or waste.

To polish the steel tubing of the steering gear use soap and fine powdered emery mixed to a paste which will remove the rust and leave the rod smooth. Emery cloth is not advisable as it may leave many scratches on the polished surface.

Should spots of tar, picked up along the road, be found hardened on the wood work, before you take your knife to scrape it off, cover the spot well with lard and olive oil which will enable you to remove the tar without damage to the paint or varnish underneath.

When renewing the leather belt on the fan back of the radiator rub the new belt well with castor oil and do so frequently as this will keep the leather in good condition and prevent deterioration from moisture.

If a clicking or tapping sound is heard in the engine do not hesitate to open the crank case and carefully examine all bearings and bearing bolts. A broken bearing bolt can be found by tapping the bearing or bolt with a light hammer. Should a broken bolt be found both bolts should be renewed as the other bolt is undoubtedly bent.

When a small hole develops in the water pipe system, drill and tap the hole, then apply a machine screw cut short enough to prevent its interfering with the flow of water through the pipe as much as possible. This same practice may be followed with slight leaks in the radiator if in such place that screw can be applied. Under the head of the machine screw it should receive a good thick coat of iron cement before it is screwed down tight. A simple little repair of this nature may save you the expense of installing new pipes, etc.

Tire Hints.

Here follow a few points about the care of tires. Most of them have been given before in one form or another, but they will bear reading again, and if carefully borne in mind they will very much decrease the tire bill for the year:

Inspect the tires after every long run and attend to cuts at once.

Repair them in a proper manner, and avoid all make-shift methods.

Fit the largest section tires your car can take.

Take special care when fitting and so avoid nipped inner tubes.

Use the best quality tubes; poor quality is the reverse of economy.

When fitting a tire do not fail to use sufficient French chalk; a lubricant between cover and tube is absolutely necessary.

Protect tires from bright sunshine when in the garage.

Take care that tires do not stand in oil and grease in the garage.

Don't fail to use protectors for spare tires carried on the car.

Don't under-inflate your tires. A slack tire means weakening of canvas, damage to bead, and short life generally.

Don't abuse the use of clutch and brake.

Don't use a tire paint which contains any matter injurious to rubber.

Don't neglect to use a good pressure gauge.

Don't forget to carry spare valve parts.

Don't let the tires stand longer than can be avoided in puddles and pools of water.

Don't fail to clean the tires with a brush before garaging.

Don't damage the tires by taking sharp turns in the roadway.

Don't wait until your tires are in a bad way. Attend to them immediately any signs of damage appears.

Don't use damaged rims; sometimes caused by running deflated tires.

Don't fail when packing a spare tube to roll it up from both ends towards the valve.

Don't think your tires are indifferent to proper and careful treatment.

Don't forget that the tires are the most important servants of an automobilist.

Don't omit to nurse them in every way.

To Protect the Grease Cups.

A good way to cover up grease cups or the small oil cups that are used in such parts as steering knuckles and connections, spring shackles and rear axles so that they may be kept free from the dirt and mud which almost invariably accumulates on them and is likely to be carried through into the bearing with the grease or oil when the cup is filled, is to procure a number of hollow rubber balls of just such size that the cups will fit within them and to enlarge the holes so that they may be forced over the cups and get a tight grip on the bottom of the cups. The balls will make absolutely tight coverings for the cups, and if they are painted the color of the car they do not by any means detract from its appearance.

You can not know engines by their paint.

To Prolong Life of Tires.

With the high grades of steel used in the important wearing parts of the automobile, the owner of a first-class car can feel that wear has been practically eliminated, and the only worry that he now has is "the tire problem." Nothing has been found to give the same resiliency and ease of riding as is furnished by air-filled rubber tires. The attempt to substitute leather, metal and tough fabrics of various kinds to save wear on the tires has been followed in most cases by the limitation of the easy-riding qualities, and therefore most automobile owners prefer to take chance of punctures with the best brands of rubber tires which they can secure from well-established and reliable makers.

Of late great study has been given on the part of chemists and others to find some means of preserving the life of the rubber as it comes from the forests. There has recently been put on the market a material called Rubberlife, which is said to be the long-looked-for preparation for preserving the good qualities of India rubber and keeping its resiliency much longer than they can be retained under the usual conditions. Rubberlife is a liquid about the consistency of sour milk and the color of rubber. It is applied to tires by rubbing it over the surface with a clean rag or sponge, or a soft brush. Before applying no other preparation of the tires is necessary other than to have the rubber clean.

The benefit of the application of Rubberlife results from the filling of the pores of the tire with the preparation, thus keeping out the various elements that are known to be destructive, such as oil, grease, sand, small stones, etc., rendering them unable to penetrate the rubber and destroy the qualities which give it life.

Even the air itself is destructive to the life of rubber, and in tires particularly the resiliency begins to decrease soon after they leave the factory. This destructive effect on the rubber is caused by the oxygen in the air uniting with the sulphur used in the manufacture of the rubber, which results in oxidization, rendering the rubber hard and brittle with little life in it to stand stress or strains. Wrapping of tires in cloth or papers is the usual thing attempted now to prevent the air acting on the rubber in tires, but this is found to be inadequate.

Rubberlife was first used two years ago in lithograph plants in the West, where it gained a reputation by preserving rubber blankets, which is a more severe test than it will ever be put to when applied to automobile tires. The preparation looks like the first real step toward solving the tire problem.

Leather Clutches.

On quite new cars a leather clutch sometimes seems to be incurably fierce. It always takes up its work with a squeak and a bite that may be felt. If the flywheel be liberally anointed with oil its action softens for a mile or two, but the oil is presently flung off by centrifugal action when the flywheel is spinning round free, and the clutch returns swiftly to its pristine condition of ferocity. Some makers are not very careful about the condition of the leather they fit to their clutch cones. When an accurately designed clutch is found to be inveterately fierce it is absolutely essential to a cure to dismount the male cone from the chassis, and to give it a prolonged and painstaking dressing with the proper oils. Some owners fail because they merely squirt a few drops of oil on the inner periphery of the flywheel. This lies against the surface of the leather till the car is used, when it is swept off by the flywheel as the two cones part company in the

act of declutching, and is flung madly about the chassis. If the clutch had been dismounted, its callous surface rasped, and the oil well rubbed in, the cure would probably have been permanent. Other owners fail because they use unsuitable oils. We have often seen a chauffeur wink knowingly when his clutch bit too hard or squeaked complainingly; then he slips his gear in neutral, lifts his footboards, injects a few drops of lubricating oil while he holds the pedal down, and then remounts with the air of a man who has successfully tackled a problem. Even supposing his leather was not burned so badly that rasping and rubbing were essential to a cure, he has used the wrong oil, castor being really best for the purpose, and he has applied the wrong oil in the wrong way; it is certain that after two or three declutchings scarcely a drop of the quantity injected would remain on or near the clutch.

Loose Spring Clips.

The spring clip bolts and nuts, although one of the most important parts of the automobile, are frequently given the least attention. It would seem that when the nuts are screwed up tight and show no apparent looseness that no further care is necessary. When the car is traveling over rough roads the spring clips are subjected to severe strain and should there be the slightest looseness the spring may be allowed to shift placing the axle out of line. After each run the nuts on these clips should be tested with the wrench and the clips examined to note if they are shifted. The thread on a bolt on which the nut has been tightened many times may become worn making it difficult to keep the nut in place. By using a Columbia Lock Nut of the original style the thread of the nut will be tightened against the bolt and the clip will probably last longer than a new one equipped with the ordinary nut. This suggestion is made by a party who has seen many thousands of old bolts re-used in this manner.

Look to the Muffler.

The muffler should be cleaned out several times during the season, as the carbonic deposits accumulate and clog up the openings. Invariably loss of power can be attributed to this source, as unless the muffler is free, back pressure upon the engine is bound to result. Whenever you think your car does not develop proper power, see that the muffler is thoroughly clean.

Frozen Radiators.

Owing to the large cooling surface of radiators the water in them will freeze in ten minutes if the car is left standing in the wind with a thermometer below freezing point and the motor not running. This is a most important matter during the winter and should be most carefully guarded.

If You Put It Away.

If the car is to be put away for any length of time, it is best to jack up all the wheels and to inflate the tires only hard enough to keep them in shape. They should be wiped over occasionally with a rag dipped in warm water, and should be kneaded to maintain their suppleness.

A Tip for the Chauffeur.

The more satisfied the chauffeur is able to make the owner with the car, the more the owner will think of him, and owners are apt to expect more from a car than they have reason to.

LIST OF EXHIBITORS AT THE NEW YORK SHOWS.

Some of the Features That Visitors Should Not Fail to Note.

The following is a list of those who exhibit at both the Grand Central Palace and the Madison Square Garden automobile shows.

For the convenience of visitors each exhibitor was asked to supply a few words giving the feature or chief point of the exhibit to which special attention is desired. In every case where a response was made the special claim is printed following the name of the exhibitor.

EXHIBITORS IN GRAND CENTRAL PALACE

Allen-Kingston Motor Car Co., 1934 B'way, N. Y.

The car made all the way through without consideration of price.

American Motor Car Co., Indianapolis, Ind.

American Motor Co., Brockton, Mass.

American Motor Truck Co., Lockport, N. Y.

Special feature, three point suspension transmission unit and jack shaft combined.

Atlas Motor Car Co., Springfield, Mass.

Bartholomew Co., Peoria, Ill.

The Glide cars which are guaranteed to give a full dollar of value for every dollar in price.

B. C. K. Motor Car Co., York, Pa.

Black Mfg. Co., Chicago, Ill.

Bowman Automobile Co., 225 W. 49th st., N. Y.

Brewster & Co., B'way & 47th st., N. Y.

Brush Runabout Co., Detroit, Mich.

Buckeye Mfg. Co., Anderson, Ind.

Lambert cars. Examine the mechanical self starter.

C. G. V. Import Co., 49 W. 64th st., N. Y.

Cartercar Co., Pontiac, Mich.

Cameron Car Co., Beverly, Mass.

Light weight, high powered cars which visitors are specially asked to carefully examine.

Chadwick Engineering Works, Pottstown, Pa.

Examine the perfected Chadwick Great Six.

Chase Motor Truck Co., Syracuse, N. Y.

Motor trucks that are remarkable for their simplicity. Valveless air-cooled motor and novel lubricating system.

Coates-Goshen Co., Goshen, N. Y.

Columbus Buggy Co., Columbus, Ohio.

Crawford Automobile Co., Hagerstown, Md.

Note the ample power of their cars for all road emergencies and the simplicity of design.

Dayton Motor Car Co., Dayton, Ohio.

DeDion Bouton Selling Branch, 1649 B'way, N. Y.

Delahaye Import Co., 2 Rector st., N. Y.

Demotcar Sales Co., Detroit, Mich.

Empire Motor Car Co., Indianapolis, Ind.

Note the easy riding and the economy of tires owing to the unique four sided springs.

Fal Motor Co., Chicago, Ill.

Fiat Automobile Co., 1786 B'way, N. Y.

Ford Motor Co., Detroit, Mich.

Gaeth Automobile Co., Cleveland, Ohio.

Will exhibit what they claim is the simplest four-cylinder car manufactured. Examine it and judge for yourself.

Grabowsky Power Wagon Co., Pontiac, Mich.

Examine the power unit, the perfect radiator system, and the steering and brake system.

Gramm-Logan Motor Car Co., Bowling Green, Ohio.

See their truck chassis and notice its distinctive features.

Hart-Kraft Motor Car Co., York, Pa.

Henderson Sales Co., Indianapolis, Ind.

Holsman Automobile Co., Chicago, Ill.

Look carefully over the car for every day in the year and all kinds of weather. No friction bearings or connecting rods.

Hol-Tan Co., 1741 B'way, N. Y.

Hotchkiss Import Co., 1855 B'way, N. Y.

Hupp Motor Car Co., Detroit, Mich.

The first low priced car to use the Bosch magneto and do away entirely with the dual system of ignition.

Inter-State Automobile Co., Muncie, Ind.

Isotta Import Co., 1623 B'way, N. Y.

Jackson Automobile Co., Jackson, Mich.

Three different sizes of cars but the same material and construction in each, and each the highest possible grade, no matter what the price.

Kissell Motor Car Co., Hartford, Wis.

Lansden Co., Newark, N. J.

Electric Panel delivery wagons and industrial trucks.

Lion Motor Car Co., Adrian, Mich.

McCue Co., The, Hartford, Conn.

McIntyre Co., W. H., Auburn, Ind.

Mack Bros. Motor Car Co., Allentown, Pa.

Note the simple three-speed individual clutch transmission.

Martin Carriage Works, York, Pa.

Maxwell-Briscoe Motor Co., Tarrytown, N. Y.

Cars Preeminent for reliability for every day road work.

Metz Co., C. H., Waltham, Mass.

Metzger Motor Car Co., Detroit, Mich.

Middleby Auto Co., Reading, Pa.

Mitchell Motor Car Co., Racine, Wis.

Midland Motor Co., Moline, Ill.

Note the unit power plant and the three point suspension. The design and construction are ideal and novel.

Moline Automobile Co., East Moline, Ill.

Moon Motor Car Co., St. Louis, Mo.

Mora Motor Car Co., Newark, N. Y.

Do not fail to examine the aluminum pan construction of their cars, which serves several important purposes.

National Motor Vehicle Co., Indianapolis, Ind.

See the new National 40, selling for \$2500 claimed to be the greatest value ever offered at the price.

Nordyke & Marmon Co., Indianapolis, Ind.

Oakland Motor Car Co., Pontiac, Mich.

Otto Sales Co., (W. S. Jones), 5144 Wayne Ave., Phila., Pa.

The Saurer Motor Truck imported from Switzerland.

Paige-Detroit Motor Car Co., Detroit, Mich.

Palais de l'Automobile, 1786 B'way, N. Y.

Panhard & Levassor, B'way & 62d st., N. Y.

Patterson Co., W. A., Detroit, Mich.

Pennsylvania Auto Motor Co., Bryn Mawr, Pa.

Pierce Motor Car Co., Racine, Wis.

See the car that has been tried out on the worst roads and in the worst weather that could be found and nothing was wanting.

Premier Motor Mfg. Co., Indianapolis, Ind.

Note the strength of the frame, the make and break system of ignition and the powerful breaking system.

Randolph Motor Car Co., Chicago, Ill.

Rapid Motor Vehicle Co., Pontiac, Mich.

Regal Motor Car Co., Detroit, Mich.

Notice the design and finish of their car and the abundance of power.

Reliance Motor Truck Co., Detroit, Mich.

Renault Freres Selling Branch, 1776 B'way, N. Y.

Reo Motor Car Co., Lansing, Mich.

Saurer Motor Trucks, (A. T. Otto), 1876 B'way, N. Y.

Schacht Mfg. Co., Cincinnati, Ohio.

The car for all purposes and that can be maintained at less cost than a horse and buggy.

Seitz Auto & Transmission Co., Detroit, Mich.

Simplex Motor Car Co., Mishawaka, Ind.
Ask to be shown all about their two cycle valveless motor.

Speedwell Motor Car Co., Dayton, Ohio.
Note the perfect inter-relation of every group of parts to every other group, and the roomy tonneau.

St. Louis Car Co., St. Louis, Mo.

Staver Carriage Co., Chicago, Ill.
A car where value rather than volume has been the leading thought of the manufacturers; not how many but how good.

Streator Grant Sq. Auto Co., 1378 Bedford ave, B'klyn, N. Y.

Sultan Motor Car Co., 1659 B'way, N. Y.
Note the removable power unit of the chassis.

York Motor Car Co., York, Pa.

Ohio Motor Car Co., Carthage, Ohio.

Ajax-Grieb Rubber Co., 1776 B'way, N. Y.
Automobile and motorcycle tires.

Alden Sampson Mfg. Co., Pittsfield, Mass.
A truck that was designed and fulfills the design of being a purely business proposition.

American Ball Bearing Co., Cleveland, Ohio.
Pressed bevel drive gear and drop forged front axles.

American Electrical Novelty & Mfg. Co., 308 Hudson st., N. Y.
Eveready ignition batteries, connectors, meters and vacuum bottles.

Atwater Kent Mfg. Works, Philadelphia, Pa.

Atwood Castle Co., Amesbury, Mass.
See their new gas headlight and their oil lamps.

Auto Improvement Co., 316 Hudson st., N. Y.
Ever Ready speedometers and tire tools.

Badger Brass Mfg. Co., Kenosha, Wis.

Baldwin Chain & Mfg. Co., Worcester, Mass.

Batavia Rubber Co., Batavia, N. Y.

Bowser & Co., S. F., Fort Wayne, Ind.

Breeze Carburetor Co., Newark, N. J.
Automatic carburetor and baby motorcycle carburetor.

Briscoe Mfg. Co., Detroit, Mich.

Brown Lipe Gear Co., Syracuse, N. Y.

Byrne-Kingston & Co., Kokomo, Ind.

Chase & Co., L. C., Boston, Mass.

Coes Wrench Co., Worcester, Mass.

Columbia Nut & Bolt Co., Bridgeport, Conn.

Consolidated Rubber Tire Co., 20 Vesey st., N. Y.

Continental Caoutchouc Co., 1788 B'way, N. Y.

Cook's Sons, Adam, 313 West st., N. Y.

Corbin Motor Vehicle Corp., New Britain, Conn.

Attention is called to the radical changes of their 1910 product in springs steering post, and body.

Cramp & Sons, Wm., Philadelphia, Pa.
Parsons' manganese bronze castings for automobile work such as are used by leading car companies.

Dayton Rubber Mfg. Co., Dayton, Ohio.

Diamond Chain & Mfg. Co., Indianapolis, Ind.

Diamond Rubber Co., Akron, Ohio.

Deitz & Co. R. E., 60 Laight st., N. Y.
See their line of fine headlights and notice the detail of their construction.

Dixon Crucible Co., Jos., Jersey City, N. J.

Motor graphite lubricants in actual use on a running transmission.

Edmunds & Jones Mfg. Co., Detroit, Mich.

Electric Storage Battery Co., Philadelphia, Pa.

Complete vehicle battery sets as designated for automobile manufacturers.

Empire Tire Co., Trenton, N. J.
See their new style checkered non-skid tread and their new demountable rims.

Excelsior Motor & Mfg. Co., Chicago, Ill.

Firestone Tire & Rubber Co., Akron, O.
All kinds of tires for all kinds of purposes.

Fisk Rubber Co., Chicopee Falls, Mass.
Examine the new removable rim and bolted on tire.

Fox Metallic Tire Belt Co., 19 McKibben st., B'klyn, N. Y.

G. & J. Tire Co., Indianapolis, Ind.
Tires and repair materials of tested and new design.

Gabriel Horn Mfg. Co., Cleveland, Ohio.

Gemmer Mfg. Co., Detroit, Mich.
Observe the adjustability of their model C gear and note the quality of their product.

Gilbert Mfg. Co., New Haven, Conn.

Goodrich Co., B. F., Akron, Ohio.

Goodyear Tire & Rubber Co., Akron, Ohio.
Wish visitors to examine their Goodyear-Doolittle demountable detachable rim.

Gray & Davis, Amesbury, Mass.

Hall Lamp Co., C. M., Detroit, Mich.
Several new designs of electric and oil lamps.

Hartford Rubber Works Co., Hartford, Conn.

Hartford Suspension Co., Jersey City, N. J.

See the two miniature cars, one being equipped with the shock absorber and the other not.

Hayes Mfg. Co., Detroit, Mich.

Heinze Electric Co., Lowell, Mass.

Herz & Co., 295 Lafayette st., N. Y.

Hess-Bright Mfg. Co., Philadelphia, Pa.
Note their two new types of thrust bearings, and examine the various parts.

Hoffecker Co., Motor Mart, Boston, Mass.

See the "steady hand" speedometer and learn why it is absolutely dependable.

Janney-Steinmetz & Co., Philadelphia, Pa.

Seamless and absolutely safe gasoline tanks.

Kokomo Electric Co., Kokomo, Ind.

Leather Tire Goods Co., Niagara Falls, N. Y.

Improved self-adjusting tread which prevents the slightest injury to the tires and tire chains which will not wear the rubber.

Lebanon Steel Casting Co., Lebanon, Pa.
Crucible steel castings which are shipped in from ten days to two weeks after receipt of the order.

Light Mfg. & Fdy. Co., Pottstown, Pa.

Lovell-McConnell Mfg. Co., Newark, N. J.

The Klaxon—perfection of signal sound; the horn that is now used by most of the high-class cars and the one that will soon be used by all kinds of cars.

McCord Mfg. Co., Detroit, Mich.

Manhattan Screw & Stamping Works, West End ave. & 67th st., N. Y.

The swell front head light. This lamp is made double. Do not miss examining it.

Michelin Tire Co., Milltown, N. J.

Morgan & Wright, Detroit, Mich.
A new tire called the Nobby Tread will be shown. Ask to have its merits explained. It will not skid.

Mosler Co., A. R., 163 W. 29th st., N. Y.
Spitfire spark plugs, timers, distributors and carburetors.

Motsinger Device Mfg. Co., Pendleton, Ind.

Muncie Gear Works, Muncie, Ind.
Parts of automobiles that are well worth examining, being in some cases exclusively new.

National Carbon Co., Cleveland, Ohio.

Oliver Mfg Co., Chicago, Ill.

Pantasote Co., 11 B'way, N. Y.
Coated top fabrics and new backings that are quite out of the ordinary.

Pennsylvania Rubber Co., Jeannette, Pa.

Pittsfield Spark Coil Co., Dalton, Mass.

Randall-Faichney Co., Boston, Mass.

Remy Electric Co., Anderson, Ind.
Magneto of the famous inductor type. Examine the cross section shown.

Republic Rubber Co., Youngstown, Ohio.

Royal Equipment Co., Bridgeport, Conn.
Note the new Raybestos friction facing for brake linings.

Sager & Co., J. H., Rochester, N. Y.

Shaler & Co., C. A., Waupum, Wis.
A new vulcanizer claimed to be exceedingly simple and fully guaranteed.

Smith Co., A. O., Milwaukee, Wis.

Spicer Universal Joint Mfg. Co., Plainfield, N. J.

Splitdorf, C. F., 1679 B'way., N. Y.

Sprague Umbrella Co., Norwalk, Ohio.
Extension tops and runabout tops, also the air-cushioned wind shield.

Standard Roller Bearing Co., Philadelphia, Pa.

Automobile axles and annular ball bearings.

- Standard Welding Co., Cleveland, Ohio.
- Stewart & Clark Mfg. Co., Chicago, Ill.
Twenty-one models of speedometers ranging in price from \$15 to \$125.
- Stromberg Motor Devices Co., Chicago, Ill.
Carburetors that are as simple as A, B, C.
- Swinehart Clincher Tire & Rubber Co., Akron, Ohio.
See their rim proposition, the most simple and practical yet devised.
- Timken-Detroit Axle Co., Detroit, Mich.
New style pressed steel shaft driven axle. Note its lightness and strength.
- Timken Roller Bearing Co., Canton, Ohio.
- United Manufacturers, B'way & 76th st., N. Y.
- United States Light & Heating Co., 30 Church st., N. Y.
Sparkling batteries and electric vehicle batteries.
- Valentine & Co., 257 B'way, N. Y.
- Veeder Mfg. Co., Hartford, Conn.
- Vesta Accumulator Co., Chicago, Ill.
- Warner Gear Co., Muncie, Ind.
Special claims of simplicity, reliability and accessibility.
- Warner Mfg. Co., Toledo, Ohio.
- Warner Instrument Co., Beloit, Wis.
- Westchester Appliance Co., 15 Canal Place, N. Y.
Notice their dry battery, guaranteed to show 25 amperes shelf test after three months' use.
- Wheeler & Schebler, Indianapolis, Ind.
- Whitney Mfg. Co., Hartford, Conn.
Driving chains, keys and cutters.
- Witherbee Igniter Co., Springfield, Mass.
- Allen Auto Specialty Co., 1926 B'way, N. Y.
See their new tire holder for demountable rim tires and their new pressure gauge.
- Alexander, H. T., 17 State St., N. Y.
- American Automobile Association, 437 Fifth ave, N. Y.
- American Stepney Spare Wheel Co., 1773 B'way, N. Y.
- Auburn Mica Co., Auburn, N. Y.
- Automobile Club of America, 54th st. W. of B'way, N. Y.
- Automobile Supply Co., B'way & 59th st., N. Y.
- Automobile Topics, 103 Park ave., N. Y.
- Bosch Magneto Co., 223 W. 46th st., N. Y.
High and low tension magnetos for automobiles and motor cycles.
- Bretz Co., J. S., Times Bldg., N. Y.
- Brownell, F. A., Rochester, N. Y.
- Brown Co., Syracuse, N. Y.
See their valve grinder in actual use, as well as their tire pressure indicator.
- Burrough Rims, 114 Liberty st., N. Y.
- Burn-Boston Battery & Mfg. Co., Boston, Mass.
It is claimed that their batteries have more current per dollar than any other. They are water-proof and have no loss while standing idle.
- Class Journal, 239 W. 39th st., N. Y.
- Clover Mfg. Co., 151 E. 126th st., N. Y.
Grinding compounds from the coarsest to the finest.
- Cycle & Auto Trade Journal, Philadelphia, Pa.
- Compact Co., 71 B'way, N. Y.
- Connecticut Oil Co., Waterbury, Conn.
Non-carbon oils and greases together with auto-soap.
- Cotta Transmission Co., Rockford, Ill.
Examine a transmission that makes different speed changes not by shifting gears but by individual dental clutches.
- Cox Brass Mfg. Co., Albany, N. Y.
Accessories of brass of every description.
- Cross, Frank H., 1773 B'way, N. Y.
See his close coupled short focus acetylene gas head lamp.
- Cryder & Co., 2583 Park ave., N. Y.
See the Ronson wrench and the non-skid tire.
- Doolittle Rim Co., 1666 B'way, N. Y.
- Dover Stamping & Mfg. Co., Cambridge, Mass.
- Driggs, Seabury, Ordnance Corp., Sharon, Pa.
- Duffy Grease Co., 520 W. 40th st., N. Y.
The special claim for their grease is a refined oil product that is the same kind of grease until it is worn out.
- Eastern Carbon Works, Jersey City, N. J.
- Elite Mfg. Co., Ashland, Ohio.
Jacks that are the most popular on the market and a tire saver and storage stand that make the tires wear a third longer.
- Flentje, Ernst, Cambridge, Mass.
Improved jounce and recoil preventer.
- Fried Ostermann Co., Rockford, Ill.
- Frasse & Co., P. A., 130 Worth st., N. Y.
- Garage Equipment Co., Milwaukee, Wis.
Take a look at four beautiful brass wind shields and their tire chains.
- Gasoline Motor Efficiency, 1 Exchange pl., Jersey City, N. J.
- Geiszler Storage Batteries, 514 W. 57th st., N. Y.
- Havoline Oil Co., 80 Broad st., N. Y.
See their water white gas engine oils and the lubricants made for the Packard Car Company.
- Haws, G. A., 73 Pine st., N. Y.
Note the attractive appearance and convenience of handling in the way his lubricants are put up.
- High Frequency Coil Co., Los Angeles, Cal.
- Hilton Mfg. Co., Boston, Mass.
- Hill Mfg. Co., Buffalo, N. Y.
They will show two new and novel seats and their compression shield.
- Howard Demountable Rim Co., Trenton, N. J.
- Horseless Age, 9 Murray st., N. Y.
- Hydraulic Oil Storage Co., 25 Broad st., N. Y.
Hydraulic gasoline system for garages by which a car tank can be filled by one person at a distance from the draw-off point.
- International Engineering Co., 1779 B'way, N. Y.
- Ideal Wind Shield Co., 1845 B'way, N. Y.
- Johns-Manville Co., 100 William st., N. Y.
Visitors are invited to note their perfect engine packing and their compound for stopping leaks in cylinders, radiators, etc.
- Johnson & Co., I. G., Spuyten Duyvil, N. Y.
High Grade steel castings which successfully take the place of drop forgings.
- Keystone Lubricating Co., Philadelphia, Pa.
- Kilgore Mfg. Co., Boston, Mass.
Air shock absorbers with normal air that acts both on the upward motion and the rebound.
- Lazarnick, N., 246 W. 42d st., N. Y.
- Lavalette & Co., 112 W. 42d st., N. Y.
Magnetos that allow operation at slow speed; note the range of advance and the easy starting.
- Locomobile Co. of America, Bridgeport, Conn.
Eleven years experience in building and the experience of the owner are combined in the car of 1910.
- Lutz-Lockwood Mfg. Co., 39 Cortlandt st., N. Y.
- Light, Oliver, Providence, R. I.
Examine a new self-firing, two cycle, air-cooled six-cylinder rotary motor.
- Merchant & Evans, Philadelphia, Pa.
- Metal Stamping Co., 30 Hubert st., N. Y.
- Miller, Chas. E., 97 Reade st., N. Y.
- Morrison & Ricker Co., Grinnell, Iowa.
- Miller Sons, W. P., Long Island City, N. Y.
Will give away 10,000 samples of oil and grease.
- Moller & Schumann Co., Marcy & Flushing aves., B'klyn, N. Y.
- Meyers, A. J., 9 E. 20th st., N. Y.
- Motor Vehicle Publishing Co., 24 Murray st., N. Y.
- Motor, 2 Duane st., N. Y.
- Newark Rivet Works, Newark, N. J.
- National Surety Co., 115 B'way, N. Y.
- N. J. Car & Spring Co., Jersey City, N. J.
New anti-skid tire in which the leather tread and rubber carcass are vulcanized by a new process.
- New York Coil Co., 338 Pearl st., N. Y.
Coils running on battery current, low tension magneto, and mechanical interrupter.
- New England Auto Journal, Times Bldg., Pawtucket, R. I.
- Newmastic Tire Co., B'way & 68th st., N. Y.

Nightingale Whistle Mfg. Co., 1693 B'way, N. Y.
Nonpareil Horn Mfg. Co., 139 Emerson pl., Brooklyn, N. Y.

Noonan Tool & Machine Co., Rome, N. Y.

Osburn Electric Co., Detroit, Mich.
Dash coil and vibrator by the use of which the frequency can be changed and each will draw the same amount of current.

Perfection Spring Co., Cleveland, Ohio.
Disassembled springs showing the details of construction and springs of all kinds.

Perfection Wrench Co., Port Chester, N. Y.

Polsom, W. F., Buffalo, N. Y.

Prosser & Son, Thos., 15 Gold st., N. Y.

(Q. M. S.), Motor Parts Co., Plainfield, N. J.

R. I. V. Co., 1771 B'way, N. Y.

Raimes & Co., 50 Ferry st., N. Y.
Automobile snow shoes, gasoline vaporizer, and the new taxicab sign.

Rothstein Mfg. Co., 1941 Park ave., N. Y.

Rushmore Dynamo Works, Plainfield, N. J.

Rutherford Rubber Co., Rutherford, N. J.
Sterling clincher tires.

Salmon, John A., Boston, Mass.

Shipman Instrument Co., Sunbury, Pa.

Sireno Co., 39 Cortlandt st., N. Y.
Mile-ahead electric horns, eight styles and sizes.

Siro Carburetor Co., Springfield, Mass.
A new and novel mechanically operated carburetor. Ask to see how it works.

Smith, Fred W., Aberdeen, S. D.

Standard Leather Washer Co., Newark, N. J.
Special attention is directed to the standardization of product and price.

Stanley & Patterson, 23 Murray st., N. Y.

Spooner & Wells, 1931 B'way, N. Y.
Beautiful transparencies, photographs and enlargements.

Stevens Co., 375 B'way, N. Y.

Stewart Auto Academy, 231 W. 54th st., N. Y.

Supplementary Spiral Spring Co., 1876 B'way, N. Y.

The Carpenter Steel Co., Reading, Pa.
Forgings and samples of very accurate work, and two transmissions that have already run over 100,000 miles each.

The White & Bagley Co., Worcester, Mass.
See the reproduction of their testing laboratory.

Tracy, Joseph, 116 W. 39th st., N. Y.

Traver Mfg. Co., P. C., Far Rockaway, L. I.

A non-skid device that it is claimed will give from 500 to 600 per cent. better service than any other.

Troy Carriage Sun Shade Co., Troy, O.

Union Battery Co., Belleville, N. J.
Dry cells and flashlights.

Tuttle Co., D. M., Canastota, N. Y.

Vanadium Metals Co., Pittsburg, Pa.
Take a look at the strongest, toughest and lightest composition metal known.

Vehicle Apron & Hood Co., Columbus, Ohio.

This firm will show what they claim is the best tire cover on the market. Ask to see it.

Victor Auto Supply Mfg. Co., New York.
The unique Vasco wind shield.

Victor Tire Traction Co., Boston, Mass.

Wayne Oil Tank & Pump Co., Fort Wayne, Ind.
Long distance gasoline storage outfits and a long distance garage pump.

Westinghouse Companies, Boonton, N. J.
Note carefully their vehicle batteries which have many distinctive features.

Wilson Trading Co., 46 Cortlandt st., N. Y.

Y. M. C. A., 318 W. 57th st., N. Y.
See the photograph of the shop and road work of the largest and best automobile school in the country.

York Auto Wheel Co., York, Pa.

Zeglen Tire Co., Chicago, Ill.

Gibnev, J. L. & Bro., 217 N. Broad st., Phila., Pa.

Standard Metalwork Co., Thompsonville, Conn.
Manifolds made from seamless brass, copper and steel tubing.

National Coil Co., Lansing, Mich.

EXHIBITORS AT MADISON SQUARE GARDEN

Elmore Mfg. Co., Clyde, Ohio.

Will show a running chassis with parts cut away in order to show the simplicity of their valveless motor.

Everitt-Metzger-Flanders Co., Detroit, Mich.

Studebaker Automobile Co., Cleveland, O.

F. B. Stearns Co., Cleveland, Ohio.

Knox Automobile Co., Springfield, Mass.
A full line which are fully equipped at their selling price.

Columbia Motor Car Co., Hartford, Ct.

Autocar Co., Ardmore, Pa.

Matheson Motor Car Co., Holyoke, Mass.

The Pope Mfg. Co., Hartford, Conn.

Lozier Motor Co., New York City.

American Locomotive Co., Providence, R. I.

Packard Motor Car Co., Detroit, Mich.

Pierce-Arrow Motor Car Co., Buffalo, N. Y.

Cadillac Motor Car Co., Detroit, Mich.

Chalmers-Detroit Motor Co., Detroit, Mich.

E. R. Thomas Motor Co., Buffalo, N. Y.

H. H. Franklin Mfg. Co., Syracuse, N. Y.

Winton Motor Carriage Co., Cleveland, O.

Stevens-Duryea Co., Chicopee Falls, Mass.

Peerless Motor Car Co., Cleveland, Ohio.

Buick Motor Co., Flint, Mich.

Selden Motor Vehicle Co., Rochester, N. Y.

The Willys Overland Co.

Hewitt Motor Co., N. Y. City.

Trucks that make good wherever they are used and the best concerns in New York are using them.

Royal Tourist Car Co., Cleveland, O.

Mercer Auto Co.

Olds Motor Works, Lansing, Mich.

Haynes Automobile Co., Kokomo, Ind.

Waltham Mfg. Co., Waltham, Mass.

Hudson Motor Car Co., Detroit, Mich.

Apperson Bros. Automobile Co., Kokomo, Ind.

Woods Motor Vehicle Co., Chicago, Ill.

S. R. Bailey & Co., Inc., Amesbury, Mass.

The Waverly Co.

Babcock Electric Carriage Co., Buffalo, N. Y.

Columbia Motor Car Co., Hartford, Conn.

The Baker Motor Vehicle Co., Cleveland, Ohio.

The Anderson Carriage Co., Anderson, Ind.

The Rauch & Lang Carriage Co., Cleveland, Ohio.

General Vehicle Co.

C. F. Splittorf, N. Y. City.

Phineas Jones & Co., Newark, N. J.
Wheels, spokes and felloes for cars.

The Jones Speedometer, N. Y. City.

Conn. Telephone & Elec. Co.

C. A. Metzger, N. Y. City.

Weed Chain Tire Grip Co., N. Y. City.

N. Y. & N. J. Lubricant Co., N. Y. City

The R. E. Hardy Co., N. Y. City.
Visitors are invited to see why Non-Fluid oil is the perfect gear case lubricant.
American Ever Ready Co., N. Y. City

The Globe Mach. & Stamping Co., Cleveland, Ohio.

Cooks Standard Tool Co., Kalamazoo, Mich.

C. Cowles & Co., New Haven, Conn.

Continental Rubber Works.

The Motz Clincher Tire & Rubber Co., Akron, O.

The Duff Mfg. Co., Pittsburg, Pa.

A. W. Harris Oil Co., Providence, R. I.

C. T. Ham Mfg. Co., Rochester, N. Y.

Vacuum Oil Co., Rochester, N. Y.

Springfield Metal Body Co., Springfield, Mass.

Link Belt Co., Indianapolis, Ind.

High Wheel Auto. Parts, Muncie, Ind.

The Noera Mfg. Co.

Havoline Oil Co., N. Y. City.

Champion Ignition Co., Boston, Mass.
 Jeffrey Dewitt Co., Newark, N. J.
 A complete line of sparking plugs including four new ones.
 Simms Magneto Co., N. Y. City.
 L. J. Mutty Co., Boston, Mass.
 K. W. Ignition Co., Cleveland, O.
 N. Y. Sporting Goods Co., N. Y. City
 Pierson Motor Supply Co., N. Y. City
 Standard Leather Washer Mfg. Co., Newark, N. J.
 McGraw Tire & Rubber Co.
 Emil Grossman Co., N. Y. City.
 Red Head Spark Plugs, Hydraulic Shield, Swivelaction Bumper, Red Rib Cable, and Universal Reel.
 The Stein Double Cushion Tire Co., Akron, O.
 The only tires manufactured with the solid laplocked base.
 Tray Plate Battery Co., Binghamton, N. Y.
 Riley-Klotz Mfg. Co., Newark, N. J.
 Horns for motor cycles and automobiles.
 Hopewell Bros., Boston, Mass.
 The Motor Car Equipment Co., N. Y. City.
 The Novelty Mfg. Co.
 Automatic Headlight Co., Buffalo, N. Y.
 American Vanadium Co.
 Stackpole Battery Co., St. Mary's, O.
 Zeglen Bullet Proof Cloth Co., Chicago, Ill.
 Lavigne Mfg. Co.
 Barnard Specialty Co.
 Livingston Radiator & Mfg. Co., Inc., N. Y. City.
 Radiators that have the extreme of radiating surface and they never leak or clog.
 P. Reilly & Son.
 Detroit Motor Car Supply Co., Detroit, Mich.
 Columbia Lubricants Co., New York.
 Thermoid Rubber Co., Trenton, N. J.
 Federal Rubber Co., Milwaukee, Wis.
 National Coil Co., Lansing, Mich.
 Hancock Mfg. Co.
 The Seamless Rubber Co., New Haven, Conn.
 Duffy Grease Co., 520 W. 40th St., New York.
 Fried Ostermann Co., Rockford, Ill.
 Garage Equipment Co., Milwaukee, Wis.
 Hill Mfg. Co., Buffalo, N. Y.
 Hydraulic Oil Storage Co., 25 Broad St., New York.
 Ideal Wind Shield Co., 1845 Broadway, New York.
 N. Lazarnick, 246 W. 42d St., New York.
 Lutz-Lockwood Mfg. Co., 39 Cortlandt St., New York.
 Light, Oliver, Providence, R. I.
 Moller & Schumann Co., Marcy & Flushing Aves., Brooklyn, N. Y.
 A. J. Meyers, 9 E. 20th St., New York.
 National Surety Co., 115 Broadway, New York.
 New England Auto Journal Times Bldg., Pawtucket, R. I.
 Newmastic Tire Co., Broadway and 68th St., New York.
 Osburn Electric Co., Detroit, Mich.
 Polsom, W. F., Buffalo, N. Y.
 Raimes & Co., 59 Ferry St., New York.
 Rutherford Rubber Co., Rutherford, N. J.
 John A. Salmon, Boston, Mass.
 Siro Carburettor Co., Springfield, Mass.
 Fred W. Smith, Aberdeen, S. D.
 Stanley & Patterson, 23 Murray St., New York.
 Spooner & Wells, 1931 Broadway, New York.
 Stewart Auto Academy, 231 W. 54th St., New York.
 Supplementary Spiral Spring Co., 1876 Broadway, New York.
 D. M. Tuttle Co., Canastota, N. Y.
 Victor Tire Traction Co., Boston, Mass.
 Westinghouse Companies, Boonton, N. J.

Wilson Trading Co., 46 Cortlandt St., New York.
 Vehicle Apron & Hood Co., Columbus, Ohio.
 Briggs & Stratton, Milwaukee, Wis.
 Rands Mfg. Co., Detroit, Mich.
 Newark Rivet Works.
 The Wright Wrench Mfg. Co., Canton, O.
 C. A. Willey Co., Long Island City, L. I., N. Y.
 Kamler Company, Milwaukee, Wis.
 Hilton Mfg. Co.
 Grimm Plaut Construction Co.
 Calmon, Asbestos & Rubber Works of America, New York.
 A pneumatic tire that is claimed has more and better rubber and more plys of duck than any other on the market.
 Woven Steel Hose & Rubber Co.
 The Waterhouse Co.
 Motor Parts Co.
 Harry A. Allers Co.
 Recometre Co. of America, New York.
 A machine that writes in ink everything the car does and tells the truth.
 B. M. Asch.
 William R. Winn.
 Vorhees Rubber Mfg. Co., Jersey City, N. J.
 Fabrics and gums for repairing automobile tires.
 Favary Tire & Cushion Co.
 The Chandler Co., Springfield, Mass.
 All kinds of name plates for automobile use.
 Rushmore Dynamo Works.
 The English & Merseck Co., New Haven, Conn.
 Automobile trimmings, hardware and fittings.
 E. M. Benford, Mt. Vernon, N. Y.
 James L. Gibney & Bro., Philadelphia, Pa.
 W. E. Pruden Hardware Co.
 Como Electric Co., Meriden, Conn.
 H. & F. Mesinger Mfg. Co., N. Y.
 The Horseless Age, N. Y.
 Nathan Novelty Mfg. Co. of New York.
 The A-Z Co. of N. Y.
 Sheet metal parts for automobiles and radiators.
 Julius King Optical Co. of New York.
 International Engineering Co.
 Motor Print, Phila., Pa.
 Apple Electric Co., Dayton, O.
 Chilton Printing Co., Phila., Pa.
 Erie Foundry Co.
 Livingston Radiator Co., New York.
 The New Departure Mfg. Co., Bristol, Conn.
 The Vanguard Mfg. Co., Joliet, Ill.
 Ajax Trunk & Sample Case Co. of New York.
 The Post & Lester Co., Hartford, Conn.
 The Willard Storage Battery Co., Cleveland, O.
 Phila. Storage Battery Co., Phila., Pa.
 National Auto Top Co., New York.
 N. S. U. Motor Co., New York.
 Motorcycle Publishing Co., New York.
 American Motor Co.
 Hendee Mfg. Co., Springfield, Mass.
 The Herring-Curtiss Co.
 Harley-Davidson Motor Co.
 Reading-Standard Co., Reading, Pa.
 Aurora Automatic Machinery Co.
 Greyhound Motor Works.
 The Pierce Cycle Co., Buffalo, N. Y.
 Excelsior Supply Co.
 The New Era Gas Engine Co.
 Eclipse Machine Co.
 F. A. Baker & Co.
 Royal Motor Works, Inc.
 The Miami Cycle & Mfg. Co., Miami, O.
 Emblem Mfg. Co.
 Marvel Motorcycle Co.
 Reliance Motorcycle Co.
 S. D. Mfg. Co.
 The Bicycling World.
 The Consolidated Mfg. Co.
 Merkel Light Motor Co.

KEEP THE METAL PARTS BRIGHT.

The appearance of an automobile depends very much on keeping the metal parts bright, whether they are of brass, nickel or silver. The electric hand buffer made by the Stow Mfg. Co. of Binghamton, N. Y., makes the work of polishing an easy matter—see illustration in our advertising columns. The buffer is not expensive, and should be a part of the equipment of every up-to-date garage. Write for circular and prices, not forgetting to mention this magazine.

DOOLITTLE DETACHABLE RIMS.—The Goodyear Tire & Rubber Company has for the past two years given much thought and attention to the question of demountable-detachable rims. As a result of these investigations, they have decided to make arrangements for the sole rights to sell Doolittle demountable-detachable rims in the United States. Negotiations were finally concluded a week ago, and within the next few days the rims will be on sale at all the Goodyear Tire & Rubber Company's branches and agencies. Doolittle demountable-detachable rims are the invention of Dr. Perry E. Doolittle, a well-known Toronto, Canada, surgeon, who, by the way, has also invented a number of other important automobile and bicycle specialties. Any car can be equipped with Doolittle Rims in a few hours, using the old wheels, felloes, casings and tubes. In the event of a puncture or blow-out, it is merely necessary to expand the rim with damaged tire and replace same with spare rim carrying tire fully inflated, and ready for use. In the event of a second puncture, the rim is contracted a full inch and a quarter, when flange ring is easily removed and tire (casing and tube) comes off without exertion. This does away with stretching tires, which does so much damage to the fabric.

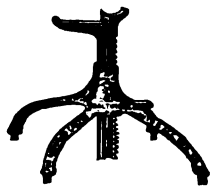
Attractive demonstrating stands with full size wheel will be found at all The Goodyear Tire & Rubber Company's branches and agencies, and it is the intention of the Goodyear Company to demonstrate Doolittle demountable-detachable rims to a very large number of automobilists during the next few months.

THREE USEFUL BOOKS SENT FREE TO OUR READERS.—We wish to call special attention of our readers to the attractive announcement on our front cover from the Maxwell-Briscoe Motor Co. They offer to send to you postpaid and absolutely without cost, three exceedingly useful, handsome and valuable booklets. One of these is a magazine called "The Co-Operator." This magazine is full of practical hints and suggestions. Another free book is entitled "How to Judge an Automobile" and is especially edited for those contemplating the purchase of a new car. The third is the "Maxwell 1910 Catalogue," showing pictures of eight models of Maxwell automobiles. As this offer may appear only once in this publication readers are urged to write at once to the Maxwell-Briscoe Motor Co., Ivy St., Tarrytown, N. Y., so as to take advantage of this generous offer.

The Remy Electric Company, we understand, has established a branch distributing office at San Francisco, Cal. The Remy line of magnetos for 1910 consists of two standard types. Type "T" has been developed for use on two cylinder and four cylinder cars, having small motors. Type "S" is for large motors and is suitable for two, four or six cylinder cars. The Remy magneto is equipped with a special non-vibrating coil upon which is mounted a switch permitting of batteries being used for starting purposes and for emergency.

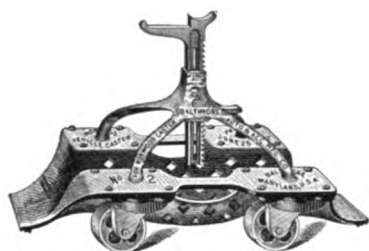
CASTERS AND PORTABLE TURNTABLES.

The Auto and Accessories Mfg. Co. of Baltimore, Md., who manufacture the well-known Norwood caster or portable turntable for automobiles, has added a very valuable attachment in the form of a rack. The purpose of this rack is to



Norwood Rack.

enable manufacturers and garage workmen to handle automobiles without their wheels. The rack has four legs which fit on the four corners of the casters. Having a jack-like center portion, it can be ad-



Norwood Rack on the Caster.

justed to suit the height of any axle. When it is desired to handle the automobile without its wheels or to carry the weight on the axle and free the wheels, the rack is placed on the caster and ad-



Norwood Portable Turntable.

justed to proper height. The car can then be moved about at will. A great time and labor saver in the factory and shop. The rack will fit on the Norwood caster now in use.

MAGICLEAN WOOD POLISH.—This preparation is manufactured by F. A. Schmoeger, Sterling, Ill., for cleaning and polishing automobile carriage bodies, and tops, and leather upholstery, it is said to be a superior article. It puts new life into the varnish and surface to which it is applied and instantly removes all dirt, grease, finger marks, cloudiness and mud stains. If your dealer does not have it, write direct to the manufacturer as above. At any rate send for descriptive circular.

SHUMARD'S ELLIPTIC SPRING OUTFIT.—This outfit is used to replace the half-elliptic single front spring commonly used on low-priced runabouts. It is moderate in cost and is acknowledged by all who have seen it to be a great improvement, as it makes a car run much easier and prevents wear and tear to the machine as well as breakage. A letter of inquiry addressed to the Special Motor Vehicle Company, Cincinnati, O., will receive prompt attention. The particulars would interest any of our readers who own motor vehicles of the type indicated.

VALVELESS INNER TUBES.—A representative of the Motor Vehicle Publishing Company called at the office of the Valveless Inner Tube Company, No. 11 Wall street, and saw the president of the company, Mr. George Wishart.

This tube differs from the ordinary inner tube in that it is what its name implies, being without any valve whatever, the tube being inflated by means of a hypodermic needle, and when once inflated, may be punctured or pierced any number of times and still retain all the original air. In fact, the needle itself is a puncture.

The writer saw a sample of this tube, and it looks as if it would do all that is claimed for it.

If you want to know how you may be sure to get home no matter what happens to your tire, write to the Valveless Inner Tube Co., 11 Wall street, New York, and state where you saw this notice.

TRAY PLATE STORAGE BATTERIES.

The Tray Plate Battery Co. of Binghamton, N. Y., has just moved into a new factory which will enable it to produce its high efficiency batteries on a larger scale than heretofore. This company's batteries show a neat and workmenlike design, and their 6-volt 60 ampere size used for automobile ignition is averaging 1200 to 1500 miles per discharge, according to the vibrator adjustment. These batteries have only recently been put on the market, after a three-years' practical road test had eliminated every weak point which could be found. The grid used is of the "checkered" type, which not only gives a greater capacity per square inch of plate surface, but also makes a plate of exceptional strength and durability, calculated to withstand the hard usage to which batteries in automobile service are constantly subjected. By a special process, the active material in the plates is made exceptionally hard and porous and the tendency to sulphate is materially diminished. Only



Tray Plate Battery.

rubber separators are used in the construction of these batteries. The battery illustrated herewith weighs 27 pounds; its dimensions are 6½ by 6¾ by 8½ inches in height. This company also makes batteries especially designed for use in electric lighting systems, obviating the difficulties of gas generators and tanks. It has published a booklet on the relative cost of different ignition systems which, together with catalogue 109 will be gladly mailed on application to Department "D," Tray Plate Battery Co., Binghamton, N. Y.

NEW DOVER NAMELESS GASOLINE FUNNEL.

The old saying, "What's in a name?" will be clearly proven as to truth or falsehood in a few weeks by one New England concern, the Dover Stamping & Mfg. Co. of Cambridge, Mass., which is now asking the public to give a name to the latest output of their factory. This is an improved funnel, which not only is effective as such, but a great fuel saver, in that it is so made as to automatically cut off the outflow of

gasoline, when the top level is reached. In this way, the surplus poured into the funnel may be poured into the fuel can and saved. The way in which this is accomplished, without complication, is interesting. Within the funnel is a brass ball, which is held up off of the outlet hole, when the funnel is in use, but as soon as the funnel is raised, the ball drops back



Dover Nameless Gasoline Funnel.

and covers the hole so that no more liquid can flow through. Those who have had experience with the overflow running all over the floor, seats and other parts of the car, will appreciate this new device at its full worth.

AUTOMOBILE MAPS.—C. S. Mendenhall, map publisher, 512 Race street, Cincinnati, Ohio, has just brought out his 1910 catalogue of automobile maps and would like to send it to any reader who may be interested.

THE FOX TYPEWRITER FREE TRIAL.—The Fox Typewriter Company, W. R. Fox, president, of Grand Rapids, Michigan, has a remarkably attractive advertisement in this issue offering their typewriter on free trial for ten days. We don't know anything about this typewriter from personal experience, but we have decided to own one of them from what they have written about them, and we don't see how they could afford to make the offer they do, giving our readers a chance to compare their typewriter with any other, unless they have a positively first class machine just as they claim they have. The company that is willing to make such a liberal offer must have something good to present, or it would soon go out of business.

Our readers should consult the announcement and if desiring a typewriter should by all means take advantage of this free trial offer.

LIBERAL CLUBBING OFFER.

The man who fails to provide his wife with suitable reading matter is doing her an injustice just the same as he does himself an injustice if he fails to provide reading matter in which he is interested.

Of course everybody knows that the Woman's Home Companion is perhaps to-day the leading woman's magazine of the country. The subscription price is \$1.50 a year.

We have succeeded in making an arrangement with the publishers of this magazine by which we can furnish THE AUTOMOBILE DEALER AND REPAIRER and the Woman's Home Companion, both for a year at \$1.90.

This offer applies to renewals of THE AUTOMOBILE DEALER AND REPAIRER as well as new subscribers. All orders should be sent to the MOTOR VEHICLE PUBLISHING Co., 24 Murray St., New York.

DIAMOND TREAD STOCKS AND REPAIR MATERIAL.—The Diamond Rubber Company of Akron, Ohio, have a special announcement in this issue addressed to repairmen in connection with their tread stocks and repair material. But consult the advertisement and send for samples, mentioning this paper.

DAVIS STEEL TIRE ARMOR.—It has been generally agreed by automobile owners that it is an economy and an advantage to adopt some form of tire protection. There are many excellent devices on the market to prevent skidding and for protecting tires from blowouts, rim cuts, and a legion of troubles which impair the usefulness of pneumatic tires. The device illustrated herewith has been used with great success by thousands of motor car owners throughout the United States, and is known as the Davis Steel Tire Armor. It is a supplementary anti-skid tread, made of glass hard steel, and the manufacturers state that it will wear from 5,000 to 10,000 miles, and when worn off the links may be replaced with new ones at a cost of 10 cents each. The main tread plate is made of chrome nickel-steel, with all edges turned away from the rubber. It cannot wear out because it does not come in contact with the road surface, and the link-plates are made of the best chrome steel nickel. The patented rim locks attach themselves with absolute security to the rim. All parts are securely held together by the strongest open-hearth steel, making a total of 880 smoothly sliding joints or hinges that retain the entire resiliency of the tire, but do not wear, from the fact that the weight of the car loosens or opens instead of bringing pressure upon them. Every reader is urged to write for further particulars to the Davis Robe Co., Chicago, Ill., and in writing mention this journal.

THE INST LIGHTER.—This is a device for instantly and conveniently lighting the acetylene gas lamps of any automobile without getting out of the car. To start the lights it is only necessary to touch a push button on the dash board. But readers are invited to consult the advertisement in this issue for full particulars, and they should also send for circular and prices to the Inst Lighter Co., Columbus, Ohio.

THE GEISZLER NON-SULPHATING STORAGE BATTERY.—The attractive two color announcement on our back cover sets forth the merits of the Geiszler non-sulphating storage battery. This battery is so well known in the trade that a detailed explanation of its construction is hardly necessary at this time. Thousands of these batteries are in use and they have given perfect satisfaction wherever used. The non-sulphating feature and the strong guarantee serve to make this battery an attractive purchase for every car owner. The new 1910 price for this battery is \$20, and if your dealer does not carry it in stock send your check for this amount to the manufacturers, and they will ship you a battery the same day. If it does not give perfect satisfaction send it back and get your money. In all correspondence address Geiszler Bros. Storage Battery Co., 517-520 W. 57th street, New York, and in writing them, mention this publication.

MOTOR WAGONS FOR BUSINESS MEN.—Many business men are now convinced that it is an economy to use motor wagons in preference to horse drawn vehicles. In this connection we wish to call special attention to the announcement in this issue of the Chicago Coach & Carriage Co., 1223 Michigan Ave., Chicago, Ill. They manufacture a line of business vehicles, motor driven, which are worthy the attention of every one of our readers who may be inter-

ested in this subject. In their advertisement they show a 16 h.p. motor wagon with a capacity of from 1000 to 1500 lbs. The weight of the car is 1500 lbs. and the price of the wagon complete, f.o.b. Chicago, is only \$900. This wagon is proving a wonderful seller and it has excited comment all over the United States. But write for their complete catalogue which will be sent free to those who will take the trouble to mention this magazine.

A NEW REMOVABLE RIM.

To be able to make a tire change on the road in two to three minutes, with no exertion and without getting one's hands and clothing hopelessly soiled, is to take from motoring its greatest drawback. The Empire Removable Rim is so simple that no one can make a mistake in operating it.

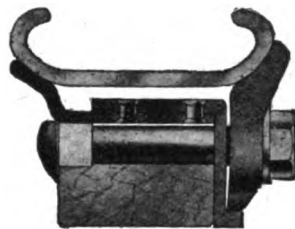


Fig. 1.

It is impossible to handle it improperly. It operates so easily and freely that even a child might make a tire change with it. Fig. 1 shows the rim bolted in its place on the wheel. Each wheel has eight bolts; but six of them should be loosened to make a change, the bolts on either side of the valve being left at all times screwed up tightly. The nuts used have collars, threaded on the inner sides, which makes it unnecessary to remove them from the ends of the bolts. Five turns of the wrench loosens the nuts sufficiently to per-

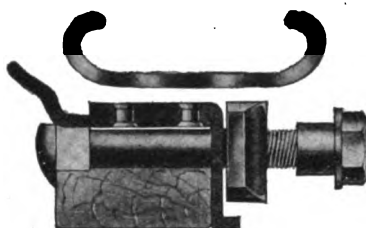


Fig. 2.

mit the lugs to turn sideways, so that rim may be removed. Fig. 2 shows nut loosened, lug turned aside, and rim partially freed. The extreme simplicity of this rim is the feature that appeals. It can never stick, and be difficult to remove. Any wheelwright can easily attach the bands, and as the operation is simple, the expense is light. For prices, which are low, address The Empire Tire Co., Trenton, N. J.

HERCULES PORTABLE CRANE HOIST.—This device is manufactured by Wm. S. Nicholls, Hoosic Falls, N. Y., and will be found illustrated in our advertising columns. It should be found in every garage. Write for descriptive circular and price and mention the AUTOMOBILE DEALER AND REPAIRER.

WELDING.—The broken parts of automobiles and other machines can be welded as strong as the original without injury to the metal so the Pollard Engineering Co., 165 No. Jefferson St., Chicago, Ill., say in their advertisement, to be found on another page in this issue, but write to them for further particulars and prices and mention this journal.

KEARN'S MODEL "L" FOR 1910.—In this issue the Kearns Motor Car Company, De-

partment "C," Beavertown, Pa., have an announcement with an illustration of their new Kearns Model "L" for 1910, price \$750. It is gearless, clutchless, valveless and the tire is punctureless. They want to send their catalogue free to any reader interested.

SWINEHART TIRES.—In this issue the Swinehart Clincher Tire & Rubber Co. of Akron, Ohio, have an announcement which refers particularly to the improvements made in Swinehart tires for 1910. They say these improvements mean more mileage and less expense. But consult their advertisement and send for catalogue giving full particulars and mention this journal.

K. & W. RELINERS.—In this issue the K. & W. Mfg. Co., Ashland, Ohio, have an announcement descriptive of their reliners, which are easily inserted. The illustration in the advertisement shows one in service, but this company wants every reader to write for special proposition, which will be forwarded promptly. In writing kindly mention this journal.

RELIABLE AUTOMOBILE JACKS.—This line heads the advertisement in this issue of the Elite Mfg. Company, Ashland, Ohio, wherein will be found illustrated several styles of jacks manufactured by this company, which they describe as safe, strong, and durable. But they want to send their 1910 catalogue and discount to any reader interested enough to write for it and mention this journal.

GOODRICH TIRES.—In this issue will be found a full page announcement of the B. F. Goodrich Company, Akron, Ohio, with branches in all of the principal cities. They give a list of the automobile manufacturers who are using their tires exclusively. In equipping an automobile too much attention cannot be bestowed upon the tire. It is one of the vital parts of the machine. If it fails the machine fails. The reputation of the Goodrich tires is world-wide. They can be obtained, of course, of any supply house. Those desiring further particulars concerning the good qualities of these tires, should write to the manufacturers as above.

SE-MENT-OL.—This preparation it is stated will dissolve in the radiator and stop any leak and fix cracked water jackets. It is manufactured by the Northwestern Chemical Co., Marietta, Ohio.

THE ALCO BURNER.—It will be conceded perhaps that the man who drives an automobile in the night without a proper light, and that means the best he can get, practically takes his life in his hands; therefore no fair price that he has to pay is too much for a good burner. If automobile owners insist upon having on their lamps the Alco burners manufactured by the American Lava Company, Chattanooga, Tenn., they will always have a good light. It may perhaps be for the advantage of the manufacturers of lamps to employ a cheap burner, but it is not to the advantage of the user of the lamp that a cheap burner should be used. But consult the full page announcement of the Company on another page headed "7 Years Acetylene Burner War Ended." The "Alco Burners" are made of the genuine German Lava, and they are constructed in all shapes as well as gas capacities and mountings for which there is any demand. These burners are for sale everywhere and you will have no trouble in getting them, if you insist upon it.

Subscribe to the "Automobile Dealer and Repairer," \$1.00 Per Year.



Diamond

WRAPPED TREAD TIRES

In all Types but in

ONE QUALITY USERS KNOW

One Particular Type:

Diamond Grips, Steel Studded, for Winter Use. Prevent skidding on wet and slippery streets. Indispensable for the Limousine or other heavy car.

Another:

The New Diamond Demountable Rim (the Already Inflated Kind). Convenience and speed for the "hurry up" motorist.

THE DIAMOND RUBBER CO. AKRON, OHIO

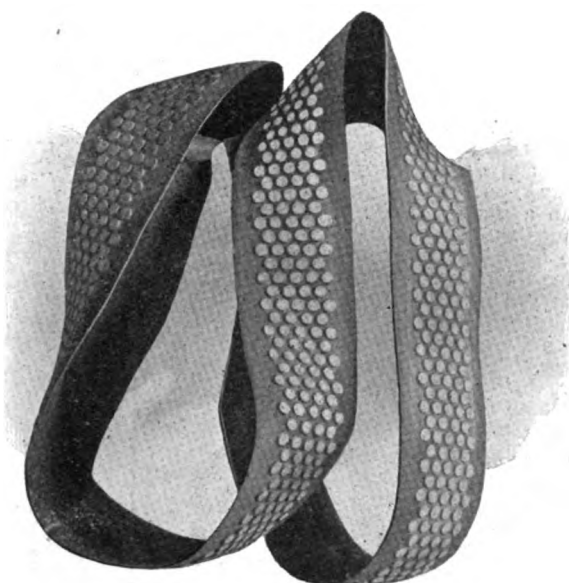
Diamond Tires are made for all styles of Rims



Please mention the Automobile Dealer and Repairer when writing to advertisers.

**FOR THE
REPAIRMAN**

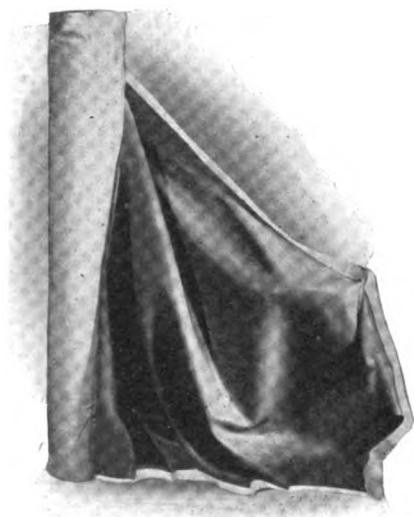
**Diamond
Tread Stocks and
Repair Material**



*Bailey Endless Tread Band
furnished ready to apply*

**Air Bags, Protection Flaps, Side Pads, Vulcanized
and Unvulcanized Tread Stocks, etc.**

A Line Complete in Every Detail. Quality—Exclusively Diamond



*Unvulcanized Gum in
the Roll*



*Our Pound Carton Tube
Patching Stock*

*Put up in air-tight and dust-
proof package. Designed ex-
pressly for small repairmen*

SAMPLES FURNISHED ON REQUEST

**THE DIAMOND RUBBER CO.
AKRON, OHIO**

A PERFECT TIRE PUMP.—If the Pitner Tire Pump, which is so small and convenient to carry and which costs only \$5.00, fulfills your every tire-inflating requirement better than all other devices combined, you want one and you want it bad. The foregoing claims are strong, but the manufacturers seem to be backed by reason, honesty and a desire not to overstate facts. They say the Pitner pump is better for you than a power-pump attached to your machine, an air-bottle, and a half dozen of the best double-action, or compound, foot-pumps all together, for the simple reason that you cannot always depend upon them while you positively can always depend upon the Pitner pump any time and any place. Better get one, or better yet, send for their illustrated booklet, No. 5, and learn all about it. A postal card will bring it if you mention this journal. Address D. H. Lawrence Co., Sterling, Ill.

STILL AT THE OLD STAND.—J. Stewart Smith, formerly of the Standard Sales Company, in the Thoroughfare Building, 1779 Broadway, New York City, still has his office at the old stand where he is doing a large business. He is selling agent for the Galvin wind shield, Whittaker tire chains, Empire blow out patch and the Wright wrench. Mr. Stewart is very popular with the trade.

PITTSBURG COMMERCIAL VEHICLES.—We want to call special attention to the attractive advertisement on our inside front cover this month from the Pittsburg Motor Vehicle Co., Pittsburg, Pa. This company manufactures a line of commercial vehicles which are exceedingly serviceable and practical in addition to being attractive in appearance. They are also low in running cost. The prices of their delivery wagons range from \$1,000 up, with capacity of 600 pounds up, and readers who are interested should write for very interesting and descriptive catalogue, which will be mailed free if you mention this journal.

BALL BEARINGS AND IGNITION SPECIALTIES.—The J. S. Bretz Co., Times Building, New York City, are sole importers of the F. & S. annular ball bearings, the U. & H. high-tension magnetos and the Bowden patent wire mechanism. They will be pleased to send descriptive catalogue on any of these articles to any reader interested, and we advise correspondence with them.

THE CHAMPION STEEL RIVET FORGE.—An extremely practical hand-forge for the automobile repair shop is the 401 Champion Steel Rivet Forge illustrated herewith. This forge gives a strong positive blast which is produced with great ease by the operator. The forge is constructed from structural steel; making it strong and durable, and has been used by railroads, bridge builders, boiler and structural iron workers of the world for the last decade. It has the famous No. 400 Champion patented high speed spiral gearing. It runs noiseless. It is supplied with the highest grade of ball bearings. It will produce a sufficient heated blast to weld 3½-inch to 4-inch iron in ten minutes, and the crank may be turned either way to produce the blast. This forge is manufactured by the Champion Blower & Forge Company of Lancaster, Pa., who also manufacture a very complete line of other forges, drills, blowers, taps, dies and screw-plates. Although their illustrated catalogue is a large volume of nearly 250 pages, it will be sent free to any of our readers, who will take the trouble to mention this magazine.

DIAMOND WRAPPED TREAD TIRES.—The Diamond Rubber Co. of Akron, Ohio, direct special attention in a full page announcement in this issue to their Diamond wrapped tread tires in all types, but in one

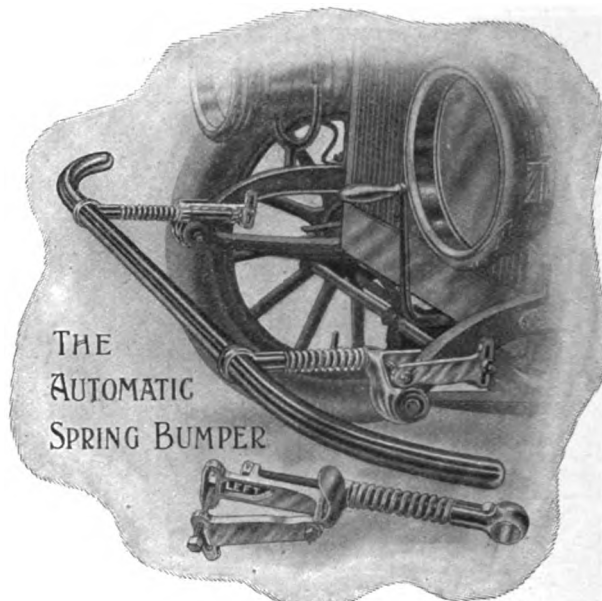
quality. They particularly request our readers to note the new demountable rim. The already inflated kind for the motorist. If you cannot obtain the Diamond goods from your dealers, write direct to the manufacturers as above.

SOME MERITORIOUS AUTOMOBILE SPECIALTIES.

The Garage Equipment Company of 402 Florida Street, Milwaukee, Wis. have just sent us a copy of their attractive illus-

This bumper is so universal that it will fit 99 per cent. of the automobiles now on the market. Any one can put it on in half an hour. It is nominal in cost, and within the reach of every car owner.

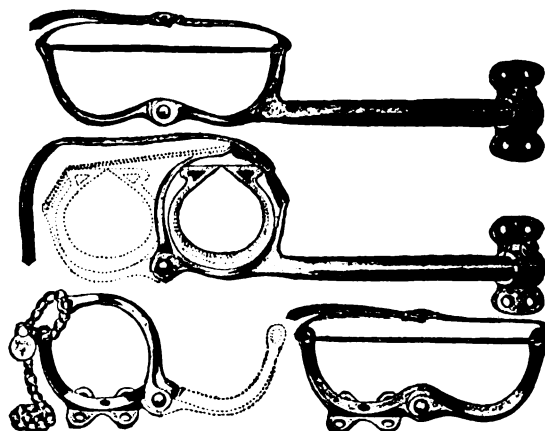
The Garage Equipment Co. also manufactures a large line of folding tire holders, a group of which we illustrate in this article. These holders will hold any size tire from 3½ to 6 inches. The brackets are fastened to the body of the car with four strong screws; they have a clamping



The "Automatic" Spring Bumper. Manufactured by the Garage Equipment Mfg. Co., Milwaukee, Wis.

trated catalogue. This company manufactures a large line of automobile specialties which should interest every individual car owner as well as the proprietors of garages and repair shops. In another part of our publication readers will find an attractive full page announcement from this company, which will well repay a careful perusal, but they manufacture so many specialties that it is impossible to show

feature which holds the long arms firmly at any angle. Strong leather straps are used. These are extremely high grade holders, although low in price. Interested readers should write for illustrated catalogue and price quotations to the Garage Equipment Co., 402 Florida Street, Milwaukee, Wis. and in writing kindly mention the AUTOMOBILE DEALER AND REPAIRER.



"Milwaukee" Folding Tire Holders. Manufactured by the Garage Equipment Mfg. Co., Milwaukee, Wis.

them all in a page advertisement. One of the most popular articles which they have introduced to the trade is an automatic spring bumper which is illustrated herewith. The feature of this bumper, which especially recommends it, is that it can be put on to any car without drilling a hole or removing the spring hanger bolt. It simply clamps to the frame and the thrust of any shock is on the end of the frame and not on the spring hanger bolt.

SPECIAL OFFER OF "A. S. B." TREADS.—Our readers should consult the announcement of the Queen Mfg. Co., Box 24, Webster City, Iowa, in this issue for special discount which they will make on their treads to the first man in each town or city sending for them. They say "when your automobile is equipped with 'A. S. B.' treads on all four wheels, your tire troubles will be over." But write for descriptive circular and special price.

"SHUR HOLD" BLOW OUT PATCH.—This is manufactured by the Inner Shoe Tire Co., Grand Rapids, Mich. It is claimed that it is equal to an extra tire because it can be applied quickly, and is just as safe. It is vulcanized and tested under 250 pounds pressure, so that it will not bulge. Write for further particulars and mention the AUTOMOBILE DEALER AND REPAIRER.

"INNERSHU."—This article is manufactured by the Inner Shoe Tire Co., Grand Rapids, Mich., and they say it will double the durability of a tire. It is easily applied, not expensive, puncture proof and prevents blow outs. See announcements on another page. Of course a great many of our readers will be glad to know about it. In writing for further particulars mention the AUTOMOBILE DEALER AND REPAIRER.

GARAGE COMPRESSOR.—The Nightingale Whistle Mfg. Co., 1773 Broadway, New

York City, have an announcement in this issue of their garage compressor. They say no garage is complete without one of these devices. They are made of metal throughout, no leather packing or washers. The highest grade material and workmanship are employed. This device is compact and works in any position, giving 200 pounds or more pressure in the shortest possible time. The complete outfit sells for \$66.50. For further particulars write to the manufacturers as above.

THE BORBEIN AUTO CO., 2109 No. 9th St., St. Louis, Mo., have an announcement in this issue of their automobile bodies and running gears. They also handle all kinds of wheels, axles, steering devices, springs, etc. In writing to them for further particulars mention the AUTOMOBILE DEALER AND REPAIRER.

VANGUARD PLUGS.—The Vanguard Mfg. Co., Dept. "G," Joliet, Ill., illustrate their

Vanguard plug in our advertising department, and give reasons why it should be used. They want to quote special prices and send a catalogue to every dealer. Write at once.

TRUMP OF MOTOR JACKS.—In a game of cards the jack of trumps is sometimes a good card to have, but for an auto owner the manufacturers state that the Barrett Automobile Jack is the "trump of motor jacks." Nearly all of the American cars of highest reputation are equipped with this jack; and every reader should investigate its merits. A catalogue will be sent on request if you write to the Duff Mfg. Co., Pittsburg, Pa. In all correspondence please mention this journal. The New York office of the Duff Mfg. Co. is at 50 Church st.

Subscribe to the "Automobile Dealer and Repairer," \$1.00 Per Year.



DON'T BUY NEW TIRES YET!

Make your old ones last by using **THE AUTO TIRE RE-ENFORCEMENT**, which re-enforces the whole tire from the inside, the most practical and successful way to strengthen a tire. Made of three and four plies of frictioned fabric, vulcanized and shaped to fit **the whole inside of the tire**. Prevents blow-outs, rim cuts and punctures and adds many miles to the service of any tire. Anyone can apply in a few minutes. They re-enforce the whole tire and cannot possibly injure either tube or casing.

We make all kinds of tire re-enforcements—reliners, inner shoes, tire sleeves, and blow-out patches, and the materials used by us will stand rigid inspection and test.

Send for samples of materials used and get our catalog and prices.

AUTO TIRE RE-ENFORCEMENT CO., E. 7th Street, Auburn, Indiana.

1910 IMPROVEMENTS IN SWINEHART TIRES

Mean More Mileage,

Less Expense.

No Delays.

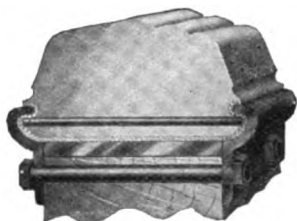
Dollars Saved.

Consider, Mr. Dealer, the advantages of Swinehart tires and rims before stepping into the uncertainties of the 1910 season.

Consider, Mr. Dealer, that customers are no longer buying tires simply because they are cheap.

Consider, Mr. Dealer, that it costs a truck owner from \$20 to \$50 each day his truck is out of commission for tire repairs, and,

Consider, Mr. Dealer, that Swinehart tires and quick detachable rims eliminate all these expensive delays.



FLANGE RIM FOR TRUCK TIRES.

Most secure and simple.

An amateur can apply the heaviest truck tire in 30 minutes without any other tools than an ordinary wrench. No delays on account of tire troubles.

MOTOR BUGGY SPECIAL.

Easiest riding cushion tire—endless—no joints. Easily applied by anyone. Improves riding and steering of car. Outwears several sets ordinary tires.

See Us at New York Shows with Full Line of

Solid and Pneumatic Tires.

We Have the Best Proposition Ever Offered for One Agent in Each City.



THE SWINEHART CLINCHER TIRE & RUBBER CO., Akron, O.

Rubberlife— A Tire Preservative—

doubles the life of your tires, and so, cuts your tire expenses almost in half. Besides, it makes your riding easier by keeping your tires always lively and resilient.

Rubberlife is a liquid, and you can apply it to your tires yourself with little effort. One gallon will keep four tires in shape for a year if care is used.

Rubberlife is \$7.50 a gallon and \$4.00 a half gallon. **We positively guarantee that Rubberlife will not injure any tire.**

Save the price of new tires.

If you store your car this winter you can save the price of a new set of tires next spring by investing in a gallon of Rubberlife now. No tires will rot if treated with Rubberlife before they are stored.

SPECIAL OFFER COUPON

Send this Coupon and \$2.25 for a special trial can of Rubberlife.

Name.....

Address.....

A.D.R. Dec.

RUBBERLIFE SELLING COMPANY,
1340 Real Estate Trust Building,
Philadelphia, Pa.

A HANDY REVOLVING SCREW CASE.

The revolving case herewith shown is specially manufactured for automobile dealers and repair men. It is a poplar wood case, cherry stained, and is made in four sizes, so as to contain from seventy-two to ninety-six drawers, each of which is properly marked to indicate the size of screw contained in the same. The cost of this case is nominal, and it will pay for itself many



A Handy Revolving Screw Case. Manufactured by the American Bolt and Screw Case Co., Dayton, Ohio.

times over on account of its great convenience. By the aid of this case the workman can put his hand on any desired screw for a repair job instantly and without the slightest trouble. This case is manufactured by the American Bolt & Screw Case Company of Dayton, Ohio. They also manufacture a complete line of bolt cases, revolving catalogue cabinets, etc. It will pay every dealer and repair man who reads this journal to write for their illustrated catalogue and price list, not forgetting to mention THE AUTOMOBILE DEALER AND REPAIRER.

AUTOMOBILE BODIES.—The Schubert Bros. Gear Co., Oneida, N. Y., builders of high grade automobile bodies, aluminum, steel or wood panels, limousines, landaulets, taxicabs, touring or runabouts, manufactured in white or painted and trimmed, as may be desired. Estimates will be cheerfully furnished. In writing mention the AUTOMOBILE DEALER AND REPAIRER. See announcement another page.

ENLARGING THEIR FACILITIES.—The Lovell McConnell Mfg. Co., makers of the Klaxon and automobile accessories, have outgrown their present factory and have purchased 10 lots on Wright and 2 lots on Emmet Street, Newark, N. J., and are building a new plant. The machine shop is 200 x 50, two stories and basement; and the foundry 75 x 40. There will also be the power plant building, a fireproof building for storing excelsior and a private garage.

MORSE LAMPS AND SPECIALTIES.—Since they have been advertising in the AUTOMOBILE DEALER AND REPAIRER a large demand has developed for the Morse Trouble and Search Lamps for automobiles and garages. These are manufactured by Frank W. Morse, 516 Atlantic Ave., Boston, Mass., who also manufactures a large line of electric fitting including hard rubber connectors, switches, sockets and electro-

liers; also reflectors, electric cord and terminals, and all kinds of electric fittings. Our readers should write to Mr. Morse for his interesting illustrated price-list which will be sent, free, if you mention the AUTOMOBILE DEALER AND REPAIRER.

AUTO TOPS AND TRIMMINGS.—A full line of automobile tops, buggy tops, carriage tops and trimmings is manufactured by the Baltimore Buggy Top Co., 702 Pennsylvania Ave., Baltimore, Md. Readers are requested to write for their interesting free illustrated catalogue and price-list, and in your correspondence do not forget to mention the AUTOMOBILE DEALER AND REPAIRER.

THE NORWOOD PORTABLE TURNTABLE.—This device is described as "2 in 1." It may be used as a caster to go under the wheels or a jack on the wheels to go under the axle. Factories, garages and repair shops can handle cars by the aid of this device either with or without wheels. The jack is adjustable and detachable. Write for circular E and discounts to the Auto & Accessories Mfg. Co., 1416 Madison Ave., Baltimore, Md., not forgetting to mention this journal.

AUTO TOPS AT REASONABLE PRICES.—Any readers desiring to purchase a good automobile top at a very reasonable price would do well to write for catalogue and quotations to Buob & Scheu, 1000 Broadway, Cincinnati. They quote as low a price as \$25 on a very good automobile top. They also manufacture bodies in the white, painted or trimmed, wind shields and dust covers. Better send for their catalogue before you forget it, and in doing so do not fail to mention the AUTOMOBILE DEALER AND REPAIRER.

WORN OUT TIRES MADE NEW.

Herewith we illustrate an old tire and then the same tire "made new" as they express it, by the Triple Tread Auto Tire Mfg. Co., 1543 Michigan Ave., Chicago, Ill. They say "don't throw your old tires away, we will make them new." Now if



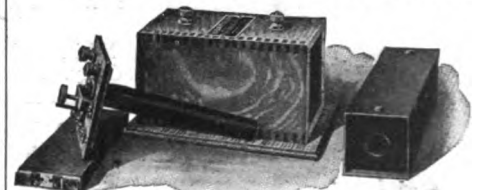
Showing an Old Tire made new by the Triple Tread Auto Tire Mfg. Co., Chicago, Ill.

they can do this a great many of our readers will be interested. We suggest that you write to them for their booklet giving further particulars and prices for making old tires over.

We have received from Chas. E. Miller, 97-101 Reade Street, New York City, an interesting illustrated catalogue, showing almost everything needed in automobile supplies. In addition to this New York store, Mr. Miller has nine branch stores and his catalogue states that his house is "the best automobile supply house in America." We understand that this catalogue will be mailed free to any of our readers, who will mention the AUTOMOBILE DEALER AND REPAIRER.

THE CARTRIDGE EASY REPAIR COIL.

The accompanying illustration shows the Cartridge sectional unit-dash-coil, made by the Cartridge Coil Company, LaFayette, Ind. This coil presents the great advantage that it can be repaired by almost any one. To do a good job of repairing on the ordinary spark-coil-unit costs as much as a new unit is worth, if the man figures his time as of any value; on the other hand with the Cartridge coil, the important parts of the unit are made separate. Each unit is made up of four parts, the secondary cartridge, a vibrator spring, a condenser and contact screw. The last two parts are equipped with iridium platinum contacts. The whole costs \$5.50. The core and primary and the hard rubber



Sectional Unit Dash Coil.

vibrator base can be furnished as repair parts as well, but these are parts that rarely require replacement. The first four items are ones that are most often required in any make of coil, and in about 75 per cent. of cases of unit trouble, the fault lies in the condenser, and only in the Cartridge Coil, can it be replaced for a few cents, this making the coil as good as new. An advertisement of the Cartridge Coil Company's product is shown on another page.

"IDEAL" LAWN MOWER GRINDER.—Repair men should consult the full page announcement in this issue of the Heath Foundry and Machine Company of Falmouth, Ohio, wherein will be found an illustration of the "Ideal" lawn mower grinder manufactured by this company. Dealers will add considerable to their income each year by grinding and sharpening mowers. Write for circulars and special terms and mention the AUTOMOBILE DEALER AND REPAIRER.

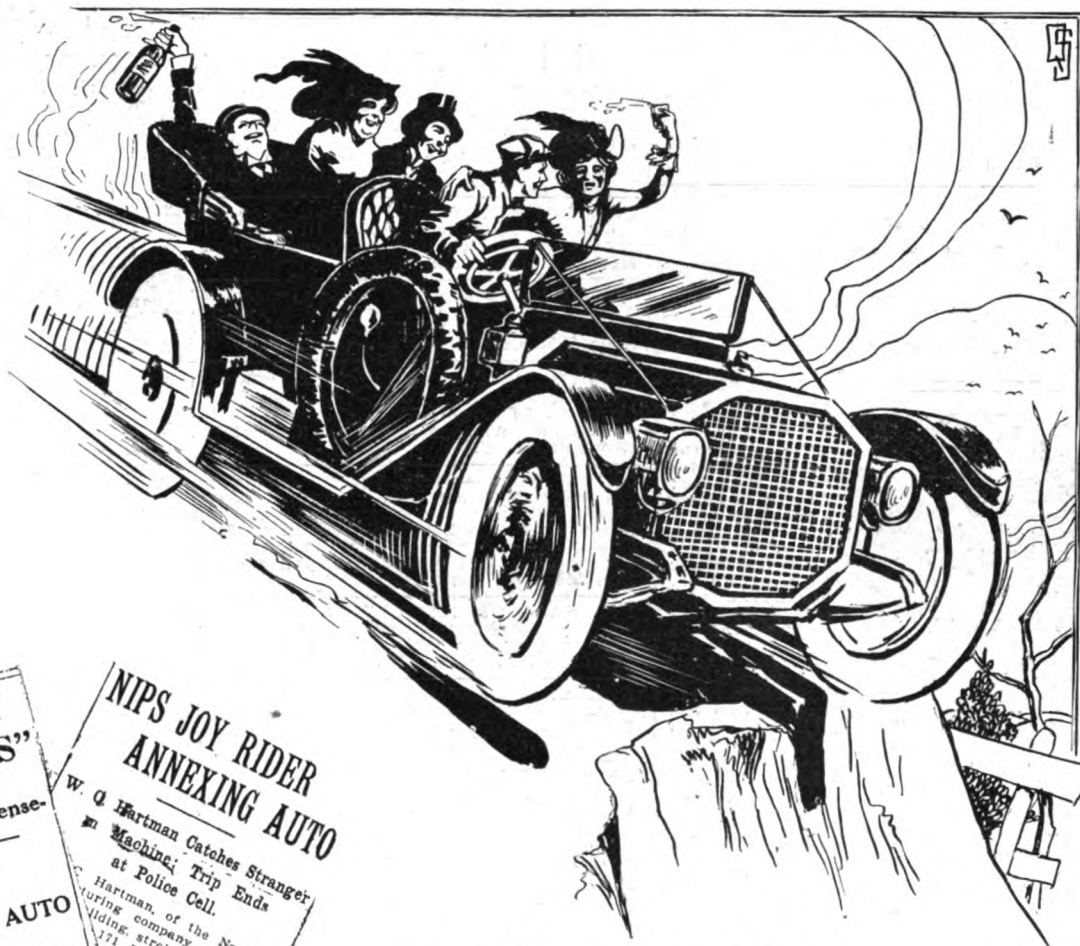
"STAY-SHINY."—This is the name of an invisible tarnish preventive manufactured by F. A. Schmoeger, Sterling, Ill., whose announcement appears in our department of Classified Advertisements. It is said that brass coated with this preparation will not tarnish under any conditions of weather. Dealers and repair men are requested to write for special terms.

SAMPLE FREE.—If any reader interested will write to the Wright & Bagley Mfg. Co., of Worcester, Mass., manufacturers of "Oilzum" and give the name of the car he uses, he will receive a sample of the particular grade of "Oilzum" adapted to their car, together with a booklet entitled "The Oil of Quality" giving full particulars. Mention the AUTOMOBILE DEALER AND REPAIRER.

RELIANCE SPARK PLUG.—These plugs are manufactured by the Jeffrey Dewitt Co., 231 High Street, Newark, N. J., and will spark in water. They say that this plug is now mechanically correct, and that it is reliable and durable under all conditions, insuring perfect ignition. While water is the worst of short circuiting matter, yet the Reliance plug will stand submersion and will produce a spark. Very much interesting information concerning this plug is contained in a booklet which the manufacturers would like to send to every one of our readers who may be interested enough to write for it, and mention the AUTOMOBILE DEALER AND REPAIRER.

NO JOY RIDES With Your Car

If Equipped with a BONGARTZ AUTO-LOCK



RUN DOWN BY "JOY RIDERS"

New Yorker Knocked Sense-
less in Heart of City—
Three Arrested.

NO TAG ON AUTO

Trio First Held on East Side for
Lack of License—
Sent Here.

Charges of reckless driving and tak-
ing an automobile without the owner's
permission, against Louis Myson-
heimer, 22 years old and a drunk and
disorderly charge against David Slup-
sky, 26 years old, 3848A Olive street,
were made as a result of an alleged
"joy ride" in the automobile of Harris

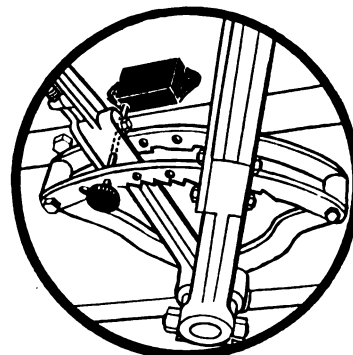
NIPS JOY RIDER ANNEXING AUTO

W. Q. Hartman Catches Stranger
in Machine; Trip Ends
at Police Cell.

Hartman, of the National
Turing company, 1208 Pe-
daling, strolled out of the
171 Woodward avenue
at the psychological
just in time to see
Hartman to motor
N. M. Hartman
took the ma-
chine and Ar-
station Mr.
ion, just
derective
d from
Hart-

A SNAP of the lock and no one can use your car till unlocked by you. The car can be pushed around the garage but cannot be driven till you turn the key in the lock. \$3.00 is a small sum to pay for the assurance that your car is safe from

theft no matter where you may leave it. Quickly attached; fits any make. Lasts a lifetime. On sale at all supply houses or sent prepaid with full instructions on receipt of price, \$3.00.



Bongartz Auto-Lock
Model A

THE BONGARTZ COMPANY

57th Street and Broadway,

NEW YORK

Please mention the Automobile Dealer and Repairer when writing to advertisers.

WANT ADVERTISEMENTS.

Under this head will be printed advertisements of shops for sale or to rent, or shops wanted, or situations or help wanted, or tools or machines (second-hand) wanted or to exchange, at the uniform price of two cents a word, which will include the address, for each insertion, payable in advance. No advertisement will be inserted for less than 80 cents, however small.

Remittances can be made in postage stamps if more convenient. Address,
MOTOR VEHICLE PUBLISHING CO.,
24 MURRAY STREET, NEW YORK.

COMMERCIAL MOTOR VEHICLES—Read the "Power Wagon" for reliable information concerning motor trucks, motor buses, motor cabs and other machines employed for business purposes. Issued monthly; single copies, 10 cents; \$1 a year. The most valuable paper of its kind published. The Power Wagon, Metropolitan Block, Chicago.

The Fox Typewriter



Free Trial

You pay nothing—you promise to pay nothing! At my expense—even to the expressage—I will place the Fox Visible Typewriter in your office, or home, alongside your present typewriter—or for comparison with any other typewriter—and if the Fox Visible Typewriter is not better than the best of the others—not merely "Just as good"—I don't want you to buy it.

To Automobile Dealers

If you knew positively that by the persistent and judicious use of a typewriter you could in 1910 double your last year's business you wouldn't hesitate an instant in purchasing one! We have just issued a large illustrated folder showing how the big city concerns have built up their immense businesses and shows how anyone in any class of business can increase that business by means of the typewriter. There are hundreds—yes, thousands—of persons in your territory who are interested in Automobiles, and Automobile Supplies and Repairs, and these parties are going to purchase somewhere. Why not send to-day for this folder and let me show you how the typewriter will enable you to get this business?

The new **FOX VISIBLE TYPEWRITER** represents to-day the highest type of typewriter building and is absolutely unequaled by any other typewriter on the market. It gives full Visible Writing, has a back Space Key, Tabulator, Two-color Ribbon with Automatic Movement and Removable Spools, Interchangeable Carriages and Platens, Line Lock, Stencil Cutting Device and Changeable Speed—it is extremely Durable and almost Noiseless.

I belong to no trust—no combination—and no one dictates to me at what PRICE I shall sell or on what TERMS I shall sell. All I want you to do is to fill out the attached coupon and send it to me personally. Send for my catalog anyway.

SENT ON FREE TRIAL

Date _____ 19____
W. R. FOX, President, Fox Typewriter Co.,
6612-6623 Front St., Grand Rapids, Mich.
Dear Sir:—Please arrange for the free trial of a Fox Visible Typewriter at your expense—not mine—without any obligation on my part. I will return the typewriter to you within ten days, if I decide not to purchase it.
Name _____
Address _____
Business _____

TOPS—Until further notice, runabout tops \$20, touring car tops \$35. C. G. Meyer & Son, Tiffin, Ohio.

FOR SALE—Automobile engine, 4 cylinder, air-cooled, Model G Knox. Apply to L. Schreiber & Sons Co., Cincinnati, Ohio.

"STEAM, Steam, Steam, That's The Stuff"—All Steam Car Owners should subscribe for the "Steam Motor Journal" a 28 page illustrated monthly devoted exclusively to the interests of the steam propelled automobile. \$1.00 per year, sample copy 15 cents. Chas. D. Sherman, 212 Orchard Road, New Haven, Conn.

Build Your Own Cars.

We can furnish you with chassis parts, including engine, axles, transmission, frame, etc., at attractive prices. Write us for details.

John H. Blacker & Co.,
Chillicothe, Ohio.

ONE 1907 REO TOURING CAR—Top and detachable tonneau, solid tires, all in good shape; quick buyer's price, \$425. F. Herbst, Wilmington, N. C.

WANTED—Agents to sell our "Innershush" and "Shur-hold Patches" in every locality. Write for particulars. Address Inner Shoe Tire Co. Grand Rapids, Mich.

DO YOUR OWN BRAZING—Aluminum solder, cast iron brazing compound, formulas 50 cents each with complete instructions. Alexander, 193 So. Oxford St., Brooklyn, N. Y.

CHAUFFEUR—Thoroughly competent, strictly Christian, desires permanent situation either in the Spring or now. Can produce three substantial references from employers. Address Leonard Ball, care of the Automobile Dealer and Repairer, P. O. Box 654, New York City.

FOR SALE OR TRADE FOR STANDARD make auto, one steam swing, seats 40 people; a money maker. For particulars address C. T. Bass, Elkhart, Ind.

FOR SALE—1908 Automobile Buggy, 12 Horse double cylinder. Practically new, fully equipped. A sacrifice. Address, N. E. Bohn, New Midway, Md.

ATTENTION—AUTOMOBILE BARGAINS, closing out balance of stock at half prices. Write us your wants. Box 275, Burlington, Wis.

FOR SALE—Autos regardless of cost—40 horse power, 4 cylinder, side entrance, 5 passenger car, top, lamps, glass front, \$490. 35 horse power, 4 cylinder, Winton, side entrance, top, lamps, \$500. 16 horse power, side entrance, Yale, \$350. New buggy-about, \$175. Michigan runabout, \$80. 4-passenger Elmore, \$150. 3 1/2 horse power motorcycle, \$55. Only a sample of what we have. Send stamp and get the bargain sheet. T. S. Culp, Canton, O.

WM. DOMINICK'S AUTO MACHINE SHOP for first-class overhauling, rebuilding and reboring; cylinders a specialty; tel. Harrison 2007. 542-544 Wabash Ave., Chicago, Ill.

CADILLAC RUNABOUT, with top; overhauled and newly painted, \$150. Waverly Electric Road Wagon, with top; newly painted, tires and batteries in fine condition, \$150. The C. F. Jackson Co., Findlay, Ohio.

STANLEYS—Exceptional bargains, due to many owners ordering the new models. Choice of many cars. Prices are lowest now. Macker-Tyler Co., 31 Central St., Worcester, Mass.

FOR SALE—Two 1909 Reo Touring cars at about half original cost. For full particulars as to condition and price address, Mertiz & Blair Garage, Livingston, Mont.

FOR SALE OR TRADE—My V S Patent Oar Lock for Boats. Will take a good automobile in part payment. Call on or address Lock Box 18, Chase, Kansas.

FOR SALE—Model "U" Stevens light six, '08. Just fitted with second set of tires, fine equipment and condition. Address, Bert Paine, Champlain, N. Y.

FOR SALE—Six Ford runabouts, one Maxwell runabout, six taxicabs, several chassis. Address R. B. Corbett, 524 W. 36th St., New York.

A WINNER. MAGICLEAN WOOD POLISH—Entirely different and far superior to all others. For Auto Bodies, Tops and Upholstery. Made under formula of famous German "Holz Glanz." Cleans like magic, with hard, glassy, glossy, lasting lustre. No acids, no alkali; absolutely harmless. Price \$1.00 quart, \$2.50 gal. Express prepaid. Agents wanted, easy seller, large profits. F. H. Schmoeger, Sterling, Ill.

FOR SALE \$600.00 1908 MODEL EARL—4-cyl. 25 horse power light roadster. Rumble seat, friction drive with double chains, gas head-lights, electric side lights and tail light, two large storage batteries. 3 extra tubes, one extra case. Car in first-class condition. H. L. Wilson, Postoria, O.

AUTO 1909 CASES AND TUBES—Morgan & Wright, Pennsylvania, name buffed. Clincher, Dunlop and quick detachable Clincher.

Size	Case	Tube	Size	Case	Tube
28x2 1/2	\$8.50	\$2.75	32x3 1/2	\$18.00	\$4.25
28x3	11.55	3.10	32x4	23.10	4.95
28x3 1/2	16.40	3.85	34x3 1/2	19.25	4.50
30x3	12.00	3.30	34x4	24.85	5.30
30x3 1/2	17.05	3.95	34x4 1/2	30.80	7.40
30x4	21.80	4.40	34x5	42.25	8.50
31x4	23.25	4.75	31x4 fits 30x3 1/2		

Single tube tires 28x2 1/2, \$10; 28x3, \$12. Seconds \$2 less. I ship, pay for tires after examination. Wm. Vanderpool, Springfield, Ohio.

AUTOMOBILE INSTRUCTION—The West Side Y. M. C. A. Automobile School gives a practical course in shop and road practice in four or eight weeks, day or evening. Provision made for out of town men. 322 West 57th St., N. Y. City.

FOR SALE—One Cadillac delivery wagon \$200. One 2-ton truck \$750. Three 3-ton trucks \$1400 each. Address R. B. Corbett, 524 W. 36th St., New York.

BRUSH DELIVERY WAGON, new. List \$600. Make me an offer. E. E. Jackson, Findlay, O.

FOR SALE

In order to make room for our new factory, we offer for sale at a low price:

- 1-18 h. p. 2 cyl. chassis.
- 1-18 h. p. 2 cyl. light delivery car.
- 1-20 h. p. 2 cyl. second-hand touring car.
- 1-14 h. p. 2 cyl. second-hand Ford motor and transmission.
- 1-10 h. p. single cyl. Cadillac motor and transmission.
- 1-12 h. p. single cyl. Olds motor and transmission.
- 1-20 h. p. 2 cyl. 4 passenger surry, 36-in. wheels.
- 1 chain drive running gear, runabout type.

BRENNAN MOTOR MFG. CO.
103 Grape St., Syracuse, N. Y.

KEELER LIGHTING ELECTRIC STORAGE BATTERY—In this issue the Keeler Battery Co., 132 Ontario Street, Toledo, Ohio, have an announcement of their \$18.00 electric lighting storage battery. They want to send a catalogue to every reader interested enough to write for it and mention the AUTOMOBILE DEALER AND REPAIRER.

ROTARY AND CENTRIFUGAL PUMPS—In this issue will be found the announcement of the Lipman Mfg. Co. of Beloit, Wis., manufacturers of Rotary and Centrifugal pumps. This concern we understand is furnishing pumps at present for many of the best automobile and marine motor boat builders, but write for further particulars and prices and mention the AUTOMOBILE DEALER AND REPAIRER.

NEW COMPANY—A new company has been organized in Baltimore, by W. Arthur Norwood, Herman Norwood, and George G. Norwood, under the name of Norwood Brothers. The capital stock is \$25,000, with \$15,000 paid in. They have purchased the four-story brick building, No. 1416 Madison Ave., one of the oldest and most complete garages in the city, with a storage capacity for 75 cars. As the Norwood Brothers are all expert mechanics and automobile men they are starting out with a splendid business and a bright future. They sell the Velie car.

Please mention the Automobile Dealer and Repairer when writing to advertisers.

Milwaukee Adjustable Wind Shield



**GUARANTEED
NOT
TO RATTLE.**

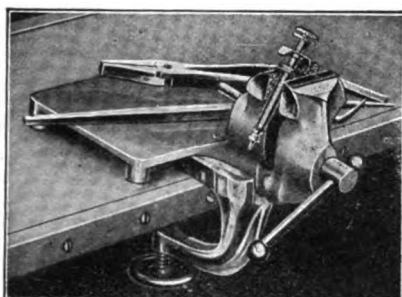
Made of
Brass Tubing.

Our aim is to
make the best and
not the cheapest
wind shield on the
market and we are
catering to high
class trade only.

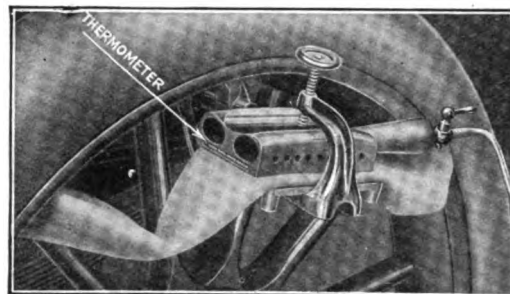
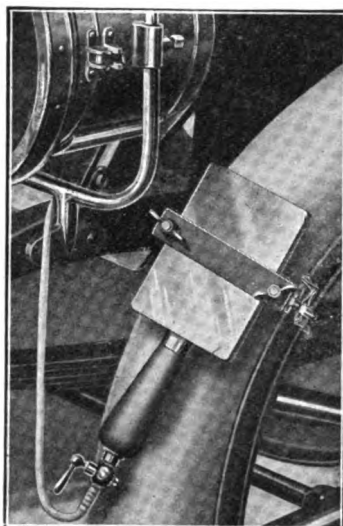


TIRE TROUBLES ENDED

Economy Vise and Vulcanizer

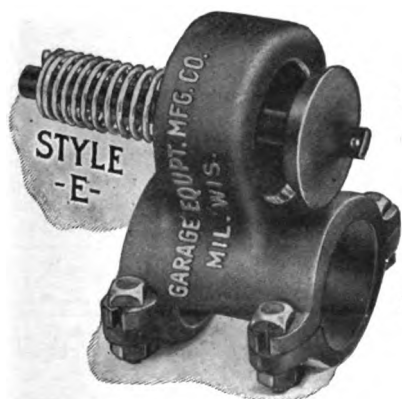


Connect to Gas Tank or Generator
anywhere you happen to be.
Guaranteed in every respect.



Costs practically nothing to operate.
Any one can do perfect work.

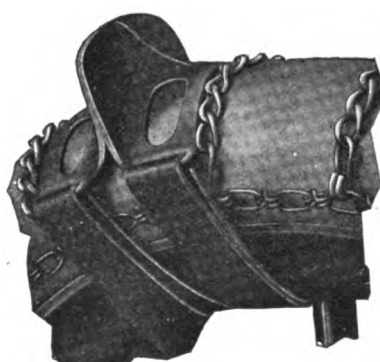
Anti-Explo Muffler Cutout



Is quickly
attached.

Will increase
your
horse power.

Emergency Mud Hook



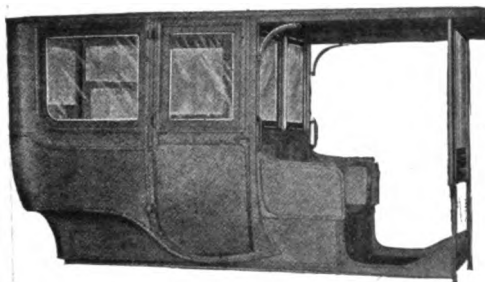
**FOR PNEUMATIC
TIRES.**

One on each wheel, we
guarantee, will get you out
of the mud, sand or snow
when everything else fails.
They can be put on when
the wheel is in the deep
mud, but chains cannot;
and they are sure to get
you out, while chains will
dig you in deeper.

The farmer will charge
the price of two sets to pull
you out of one hole.

Send for our Complete
Catalogue of Live Specialties.

GARAGE EQUIPMENT MFG. CO.
402 Florida St., MILWAUKEE, WIS.



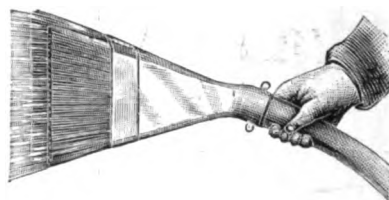
AUTOMOBILE BODIES.

We are builders of High-Grade Automobile Bodies, in Aluminum, Steel, or Wood Panels.

Limeousines, Laundolets, Taxicabs, Touring, or Runabouts. Manufactured in White, or Painted and Trimmed. Get in touch with us at once. Estimates cheerfully furnished. Four years' experience.

SCHUBERT BROS. GEAR CO.,
ONEIDA, N. Y.

THE AUTO WASH BRUSH



With this convenient Wash Brush it is possible to get into all crevices where it is impossible to do so properly with a sponge, and party washing keeps his Hands Free of Water as shown in the cut. This brush is made of the very best of soft hair. The water passes through the center of brush, always keeping it clean, at the same time throwing

water on the car. The brush can be removed from its holder, if required, and used as a spray for garden purposes. Price, \$2.50.

We also manufacture Overhead Vehicle Washers, both plain and with electric lights, also with automatic water cut-off.

SEND FOR CATALOGUE A.

I. J. SMITH MFG. CO.,
4283 PARK AVE., NEW YORK CITY.

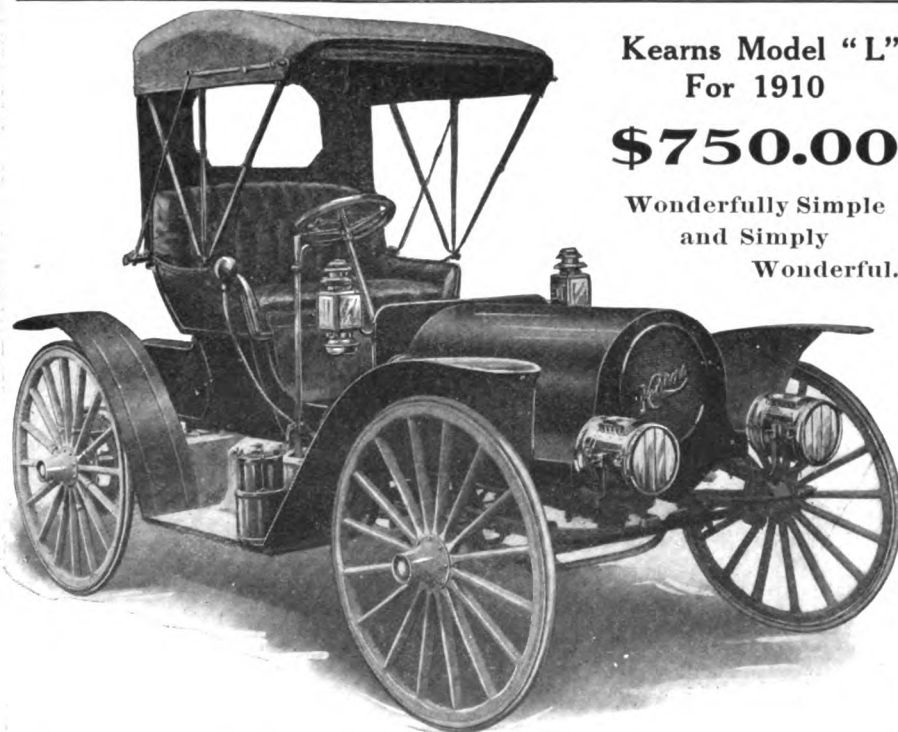
Empire Tires

WEAR LONGEST

EMPIRE TIRE COMPANY

Branches and Agencies in all the Leading Cities

Main Office and Factory, TRENTON, N. J.



Kearns Model "L"
For 1910

\$750.00

Wonderfully Simple
and Simply
Wonderful.

GEARLESS—CLUTCHLESS—VALVELESS—PUNCTURELESS

All objectionable features which have been a source of annoyance to automobile users have been dispensed with in the "Kearns." No waiting, no delay, always ready: Friction transmission, two-cycle air cooled 3-cylinder motor, 18 H. P., are the IDEAL features incorporated in the "Kearns." It is a summer or winter vehicle of pleasure, a physician's or business man's car, and a business getter in city or country. Built from the ground up on scientific principles, and must therefore not be misconstrued for a motor buggy that is only assembled and sold at a low price. Consider quality and compare with cars selling at 50 per cent more, and note every time that the "Kearns" competes in construction and style, but sells at a price the average man can afford to pay for a reliable automobile. Let us send you full particulars and catalog. 10 Models to choose from. 1910 output estimated at 1000 cars.

KEARNS MOTOR CAR CO., ADDRESS DEPT. "C," BEAVERTOWN, PA.

Eastern Self-Measuring Pump

Our 1907 Model, shown herewith, will quickly pay for itself in any garage.

**Convenience,
Economy,
Safety.**

Not one drop of Gasoline wasted.

Gasoline Tanks,
Pumps,
Complete
Storage
Outfits.

Get full information by writing to

Eastern Oil Tank Co.
Lowell, Mass., U. S. A.



Buy from the Factory

American Cigars are strictly hand made, long filler. Superior quality tobacco. A high grade cigar at a minimum price, equal to what you are paying twice the price for. Sent direct to you from our factory at \$2.00 box of 50, delivered by express, prepaid, any place in the United States.

A. SALOMON & SON, Kalamazoo, Mich.

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THE DOW PERFECTED MAGNETO

For the Man Who Drives His Own Car and for the Chauffeur Who is His Own Mechanic.

Sparks at a finger-turn. Starts Motor on Quarter-turn of Crank. Gives Hottest Arc Flame Spark ever obtained from a High Tension Ignition Magneto. Gives Complete Combustion and Increased Fuel Efficiency.

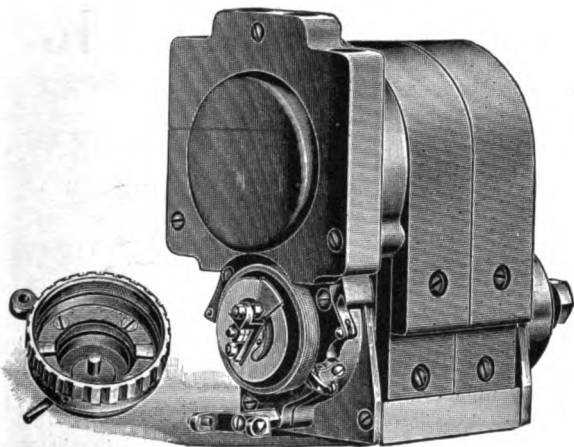
Safety Spark Gap protects armature against puncturing. Distributor with no rubbing contact prevents difficulties from wear and dirt. Interrupter Adjustment assures same broad, efficient points at all times.

The Dow Perfected Magneto sets a Standard of Service and Dependability never before reached in Magneto Construction.

To any responsible person, owning a Motor Car, Motor Boat or Stationary Gas Engine, we will sell the Dow Perfected Magneto on

THIRTY DAYS' TRIAL

subject to his comparing it in efficiency, in details of construction, and by every possible test, with any other ignition system made. No other standard Magneto can be sold on such terms. No other Magneto can stand comparison with the Dow Perfected. It is the Best Magneto that Mechanical and Electrical Ingenuity has ever devised.



Every Dow Perfected Magneto is covered by an **UNLIMITED GUARANTY** restricted only by reason and common sense. 50,000 miles on a demonstrating car, without an adjustment. Not a skip. Not a bit of Ignition Trouble. That same Dow Magneto is now Doubling the Distance and the Record.

The Dow Perfected Magneto does not base its claims on what was accomplished a decade ago. Any Magneto was the best then, for there was no other Magneto.

The Dow Perfected Magneto is the Best that **IS!**

Write for the details of our **ABSOLUTELY UNEQUALLED SALES OFFER.**

Send for Practical Facts concerning Ignition and Ignition Difficulties. A Postal Card will bring it.

DOW MANUFACTURING CO., Braintree, Mass.

DON'T START ON THAT TOUR WITHOUT IT

THE Spitzli GUARANTEED AUTO JACK

"THE BIGGEST LITTLE THING ON EARTH."
No. 12 Net Retail Price \$2.50

Listen: Here in a nutshell are a few of its best features:

In the first place it weighs only 5½ pounds—next to nothing.

BUT IT LIFTS A 4,000 POUND CAR with the pressure of one foot on the handle. Did you get that—about the foot?

IT WORKS WITH THE FOOT! What a blessing! No groveling in the dust or mud on the hands and knees. You put the Spitzli Jack under the car, slide the extension ladder up to the axle and then press down with the foot on the handle. With every full stroke the load is lifted one-half inch. Compound Safety Clutches hold it there as firm as a rock until the next stroke sets it higher.

And lowering the load is a cinch.

Just throw off the reverse controller with your toe, press down on handle with the foot just the same as in lifting, and down comes the car—steadily—inch by inch, without jerk or a jar, as gently as a mother lays her babe in the cradle.

Sounds easy, doesn't it?

Well, that's the way it works.

Then again:—

The Spitzli Auto Jack doesn't take up any room to speak of in your tool box—only 10½ x 8½ x 8¼ inches. That's worth considering if you want to save space. It's the **smallest** Jack in the world for what it does.

But that isn't all—

There are a number of other remarkable and practical points about this big little Jack. They are told plainly and interestingly in a little booklet "I" which is just hot off the press.

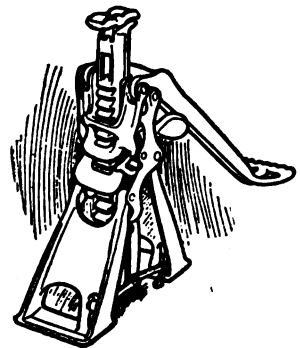
Send us your name and we will be glad to mail it to you right away.

The net retail price of the No. 12 size is \$2.50. That's the price your dealer will ask you for it. If you can't get it from him send us a money order for \$2.55 (85c. for express) and we will send it direct.

The Spitzli Jack is made in 5 sizes and every Jack is fully tested before leaving the factory. They are made of best quality of material and are **guaranteed** to work any time or your money back.

Don't start off on the Tour until you get a Spitzli Auto Jack and **get it now**—while the subject is fresh in your mind.

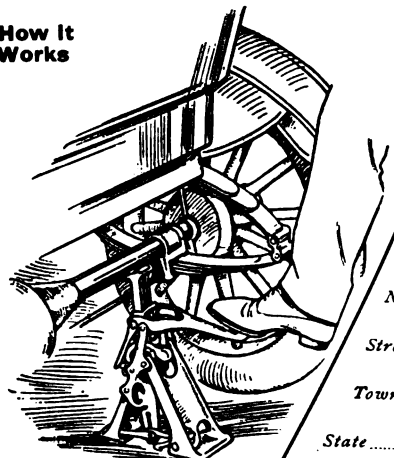
Anyway—send to-day for the booklet.



SPITZLI MFG. COMPANY

Utica, N. Y.

How It Works



SPITZLI MFG. CO.
Utica, N. Y.

Send Free Booklet "I" showing five sizes of the SPITZLI AUTO JACK and how it works.

Name.....

Street.....

Town.....

State.....

A. D. R.

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To The Man Who Uses or Sells Auto Tools

Buffum Tools for automobile work represent in their design the best ideas of the most expert mechanics.

Some little mistake in a detail of the design of a tool makes *all the difference in the World*. Buffum tools are *right*. We know that, for several very good reasons. One indication is the increasing demand from places where we have already sold large quantities.

These tools in range cover *all* operations in auto construction and repair.

Buffum tools are known to give the best results and service. The name "Buffum" guarantees the *grade* of the tool. High grade workmen *insist* on having Buffum tools.

Get the Buffum Catalog

Just fill out the coupon below, enclose it in an envelope and send it to us and we will forward you by return mail our catalog of automobile tools.

This catalog is *very good* for reference whenever you are in the market for tools, as it is complete as to description and well illustrated. We desire to place one in the hands of every mechanic and every purchasing agent in the automobile field. It is strong on—

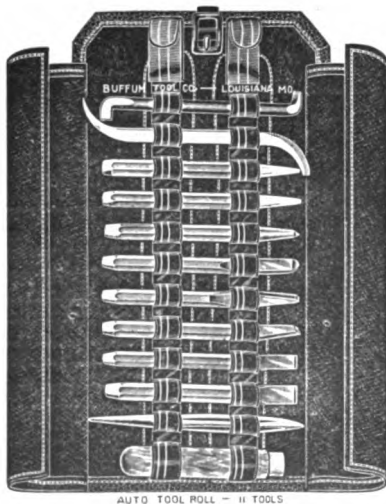
Chisels of all types, Punches, Screwdrivers, Cotter Pin Tools, Auto Bearing Scrapers, Bearing Scraper Sets, Tool Sets in fine variety, Gad, Lip and Tap Tongs, Removing Tools, Packing Irons, Carbon Scraper Sets, Off-Set Screwdrivers, Pin Punches, Blunt End Cold Chisels and Calking Irons.

No tool leaves our factory without undergoing *careful* inspection. The Buffum standard of excellence is extended to *every* item of our production. You can order from us understanding that we stand behind our goods.

All leading dealers sell Buffum Tools. Write now for the catalog.

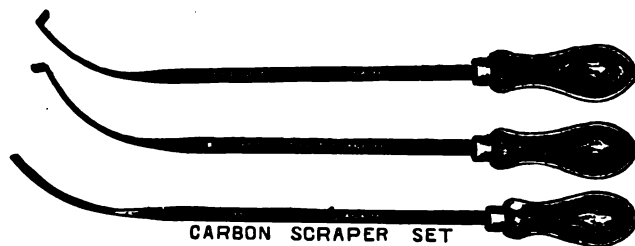
BUFFUM TOOL CO., Louisiana, Mo.

C. S. LAWRENCE, Eastern Sales Agent,
117 Chambers Street, Telephone, 2063 Worth.



Automobile Tool Roll.

Twelve High-Grade Tools in Roll of Imitation Leather, Cloth Lined.....\$3.50
This is a famous value. The set takes care of most work arising in general automobile repairing. It includes one Special Pin Punch, one Plain Punch, one Center Punch, one Diamond Point Chisel, one Round Nose Chisel, two Flat Cold Chisels, one Bearing Scraper, one Offset Screwdriver, one Cotter Pin Tool and one Tool Handle.



Standard Carbon Scraper Set.

Specially made to scrape carbon from tops of cylinders and pistons and the exhaust parts of gas and gasoline engines. Carbon on inside of cylinders causes pre-ignition and engine to overheat, while carbon in exhaust parts reduces power often over one-half. Price of set of three pieces packed in a pasteboard box.....\$1.00

SPECIAL COUPON—FILL OUT AND MAIL.

BUFFUM TOOL COMPANY,
Louisiana, Mo.

Gentlemen:—Kindly send me catalog 1, Section A, showing auto tools and tool sets.

Name.....

Occupation.....

I buy my tools from.....

Address.....

Town and State.....

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O. K'd AGAIN FOR NINETEEN-TEN **GOODRICH TIRES**

have been selected by leading automobile manufacturers of America as the regular standard equipment for all their cars.

This special seal of approval has been signed by the following motor car manufacturers:

H. H. Franklin Mfg. Co., Syracuse, N. Y., makers of the Franklin.
Pierce Arrow Motor Car Co., Buffalo, N. Y., makers of the Pierce Arrow.

Dayton Motor Car Co., Dayton, O., makers of the Stoddard-Dayton.
Winton Motor Carriage Co., Cleveland, O., makers of the Winton.
Thos. B. Jeffrey Motor Car Co., Kenosha, Wis., makers of the Rambler.

Auburn Automobile Co., Auburn, Ind., makers of the Auburn.
Moline Automobile Co., E. Moline, Ill., makers of the Moline.
Stanley Motor Car Co., Newton, Mass., makers of the Stanley Steamer.
Premier Motor Mfg. Co., Indianapolis, Ind., makers of the Premier.
Owen Motor Car Co., Detroit, Mich., makers of the Owen Car.
Speedwell Motor Car Co., Dayton, O., makers of the Speedwell.
Lexington Motor Car Co., Lexington, Ky., makers of the Lexington.

All well-known manufacturers are glad to equip their cars with **Goodrich Tires** when requested.

Each year the automobile manufacturer tries to make his car better than the year before in every detail of construction and in the quality of accessories. The most vital accessories, the tires, are not overlooked, and these tremendous contracts with the **B. F. Goodrich Company** mean that **Goodrich Tires** are believed to be the best tires made, by the leading manufacturers as well as by contestants, owners, amateurs and professionals throughout the United States.

THE B. F. GOODRICH COMPANY, Akron, Ohio

Largest in the World. Branches in all the Principal Cities

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Red Head
TRADE MARK



Trouble never troubles those who use RED HEAD Spark Plugs. The porcelain laughs at the heat—Its efficiency is proverbial.

All Sizes—All Styles
Porcelain or Mica, \$1

EMIL GROSSMAN COMPANY
232 West 58th Street - New York

Branches: { Chicago, 1436 Michigan Ave.
Detroit, 874 Woodward Ave.

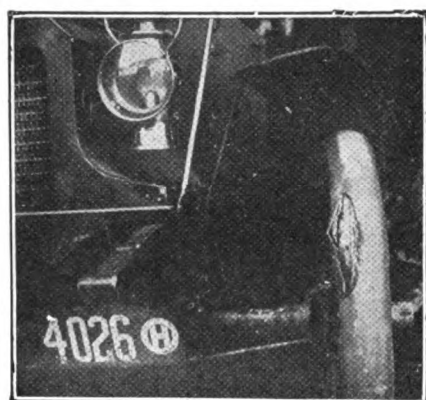
If you have a reputation for providing your customers with the best,
The Hydraulic Shield
will uphold that reputation.

\$30.00



Emil Grossman Company, Mfr.
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New York

BRANCHES:
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Patents Pending.

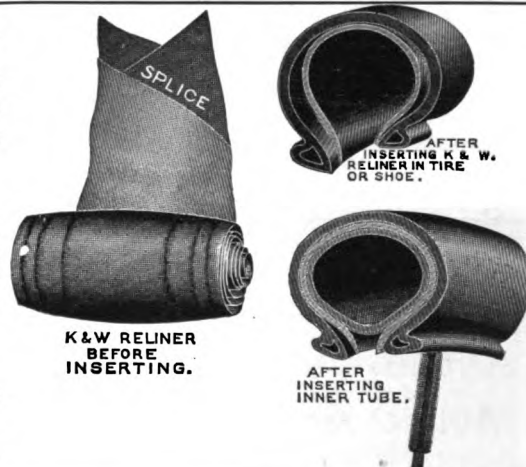
K & W RELINERS
are so successful
that Tire Experts
believe we have
solved the TIRE
PROBLEM.

Milwaukee, Wis., Aug. 16, 1909.
Gentlemen:—Enclosed please find order for fifty of your Reliners. Within the past three months we have used about three dozen of these Reliners, and up to date they have given excellent service. We have not received one complaint in this course of time.

Yours truly,
Milwaukee Tire Repair Co.

EASILY INSERTED. PICTURE
SHOWS ONE IN SERVICE. "Write
FOR OUR PROPOSITION, ETC."

K & W MFG. CO. Ashland, Ohio.



Look—\$18.00
KEELER
Electric Lighting
Storage Battery

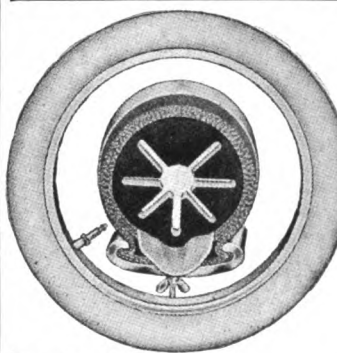
For Automobiles.
NON-CORROSIVE. Standard sizes, and prompt attention given to special sizes. Carry full line of Lighting Accessories.

SEND FOR CATALOGUE.

Keeler Battery Co.,
132 Ontario Street, - - Toledo, Ohio.



THE IDEAL AUTOMOBILE TIRE
Is the PNEUMATIC TIRE with the
Brameld Non-Collapsible Inner Tube



Pat. Sept. '08.

These tubes are designed to carry the loaded car when the tires become deflated by punctures or other causes, entirely doing away with all repair work on tires while on the road. No change whatever required in present equipment; simply pull out the collapsing tube and insert The Brameld Non-Collapsible Tube in the old casing; and the tire is good until the last layer of fabric is worn through. No stopping—No delays—No worry—Keep a-going. Your tires at all times in running condition—Inflated or deflated. Write today for price list.

**The Brameld Non-Collapsible
Pneumatic Tire Co.,**

22 Hopper Street, Paterson, N. J.

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ROAD MAPS**

**MAPS AND GUIDES
FOR
AUTOMOBILISTS.**
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C. S. MENDENHALL, PUB.,
39 Opera Pl., Cincinnati, O.

**SEAMLESS STEEL
TANKS**
TINNED & TESTED
JANNEY, STEINMETZ & CO. PHILA.

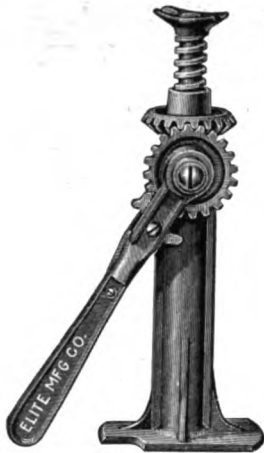
See Our Exhibits Both New York Shows

F & S - The Dependable Kind.
J.S. BRETZ COMPANY
Sole Importers
TIMES BUILDING, NEW YORK

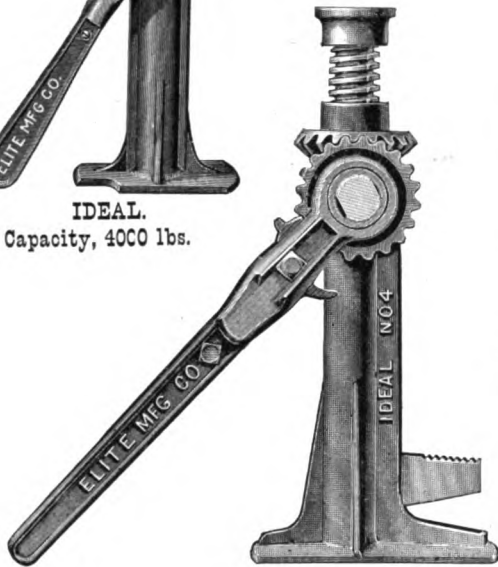
ANNULAR BALL BEARINGS

THE RELIABLE AUTO JACK

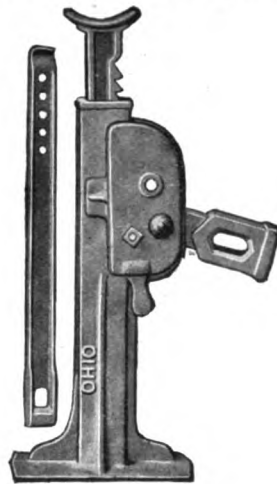
SAFE, STRONG, COMPACT, DURABLE



IDEAL.
Capacity, 4000 lbs.



IDEAL TRUCK JACK. Capacity, 5 tons.



OHIO RATCHET.
Capacity, 2000 lbs.



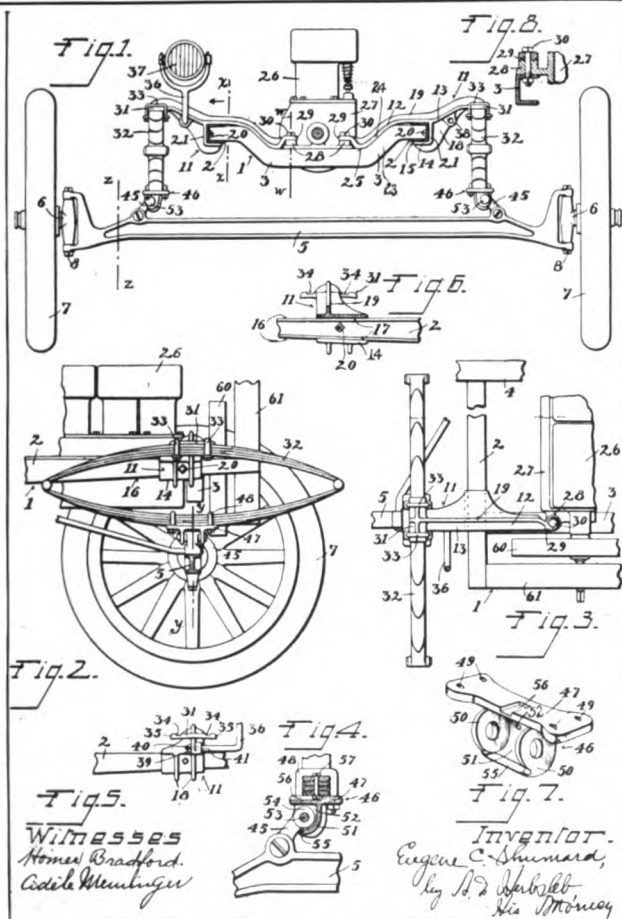
RELIABLE.
Capacity, 4000 lbs.



TIRE SAVER.
Prolongs the life of the tire one-third.

SEND FOR 1910 CATALOGUE AND DISCOUNT.

ELITE MANUFACTURING CO.,
ASHLAND, O.



Reproduction of Patent, Showing Detail of Parts, and the Manner of Attaching.

SHUMARD'S Elliptic Spring Outfit

"FOR RUNABOUTS"

This outfit is used to replace the half-elliptic single front spring commonly used on low priced runabouts.

In due respect to the makers of these cars we do not mention the name of any particular car, but we will forward full particulars upon request. A letter of inquiry will receive our immediate attention.

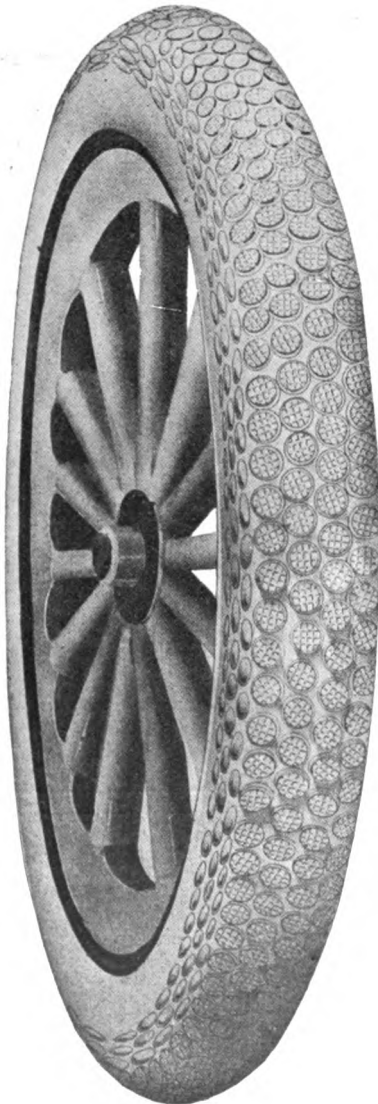
THE SPECIAL MOTOR VEHICLE CO.

Cincinnati, O.

Please mention the Automobile Dealer and Repairer when writing to advertisers.

Maximum Use INVESTMENT

QUESTIONS TO BE ANSWERED



Are you one who believes it necessary to put in winter quarters that car, just the moment the first blasts of winter strike?

Are you doubtful, about the secure running of the car, because the roads may be sleet-covered or slippery?

Are you content, in other words, to have tied up, a good share of the winter months, from \$1,000 to perhaps \$10,000, in a car from which you derive no use?

Is it real good business to have a \$1,000-\$10,000 investment non-producing, for one-third or one-fourth of each year?

These, friend, are questions that dodging won't help the actual existing conditions one bit.

What do you motor for?

For pleasure alone, or for pleasure mixed with utility—business reasons?

If so, the more you can use your car, and with perfect assurance of safety, the better is made your investment.

BRICTSON **DETAC**

IN IDLE INVESTMENT OF \$1,000 TO \$10,000

You wouldn't permit from \$1,000 to \$10,000 to lie in a depository without earning something.

So, why permit the same amount to remain in your car, unless you receive as near as possible every day's use from that car?

There, we have the message for you.

A message for every earnest, thinking motorist, who believes in using his car every day it can be driven.

The message means an investment productive the year 'round, from January to December, every month of the twelve.

THE BRICTSON MANUFACTURING CO.

Box A. D. 12

Brookings, South Dakota, U. S. A.

From Your CAR- Do You Get It?

No, we're not suggesting a millenium in motoring, not yet, but we will suggest a way to better motoring, every day your car goes out.

Simply equipping your tires with **BRICTSON TREADS (Detachable)**, brings about the desired results.

YOU CAN'T MOTOR WITHOUT TIRE PROTECTION

The same tires, without such protection, are in no condition to cope with slippery or icy roads. They slip. They are quickly worn. They are ten times more open to punctures.

Yes, you must leave your car locked in the garage, when winter holds the grip on roadways.

You take chances too great, from accidents, and are sure to pile up faster than ever tire bills.

Bricton Detachable Treads, a solace to motorists everywhere, remove tire difficulties.

Insuring, because of roughened steel studs, firm grip upon icy thoroughfares, making certain, if you need, the cutting of corners without the customary risk.

Protecting, because of combined covering between tire and roadway of canvas, leather, steel studs and steel rivets, from the rapid wear of the tire, and from the sure puncture and blow-out.

Thus, when the garage door is thrown open on a brisk winter morning, and out you guide the car, there is present the relief that you'll reach the office, meet the appointment, on the minute. And without damage to temper or to tire.

TREADS HABLE

INVESTIGATE THIS PROPOSITION

You ought, for the sake of making your investment more productive, making it return greater dividends each year, investigate, this very minute, **THE BRICTSON DETACHABLE TREAD PROPOSITION.**

Do this by cutting out the coupon, sending it filled out for our latest booklet.

You must admit, when the booklet arrives, that the evidence therein set forth makes an unassailable case in favor of Bricton Treads, and the genuine good they are to every motorist.

Simply send the coupon, this very moment. We'll take the responsibility of submitting convincing proof.

SEND THE COUPON THIS VERY MINUTE

THE BRICTSON MANUFACTURING COMPANY

BROOKINGS, SOUTH DAKOTA, U. S. A.

Gentlemen :—

Your Bricton Tread interests me. When I know more about them, I'll decide whether to equip my tires. As I am open-minded, send your booklet, "The Enemy of Tire Expense," and quote prices.

Name _____

Address _____

A.D. 12 I use this car _____

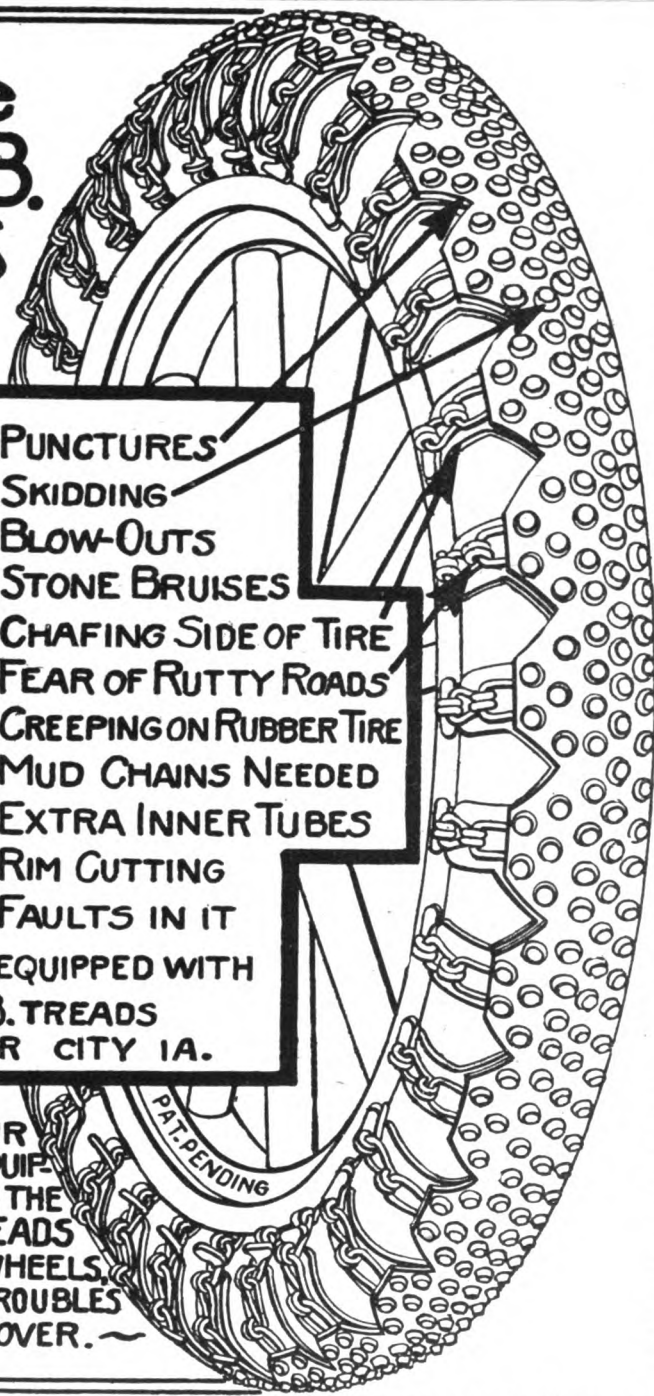
The A.S.B. TREADS

NO

PUNCTURES
SKIDDING
BLOW-OUTS
STONE BRUISES
CHAFING SIDE OF TIRE
FEAR OF RUTTY ROADS
CREEPING ON RUBBER TIRE
MUD CHAINS NEEDED
EXTRA INNER TUBES
RIM CUTTING
FAULTS IN IT

IF CAR IS EQUIPPED WITH
A.S.B. TREADS
WEBSTER CITY IA.

WHEN YOUR
AUTO IS EQUIP-
PED WITH THE
A.S.B. TREADS
ON ALL 4 WHEELS,
YOUR TIRE TROUBLES
ARE ALL OVER.



We want a few cars fitted with the A. S. B. Treads in every town in the United States for advertising purposes, and for these sample sets we are going to give you a big discount from our price list, which will only go to a very few. But the first one in a city or town to order a full set will get the grand price discount. See that you are, that ONE.

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QUEEN MANUFACTURING COMPANY, Box 24, WEBSTER CITY, IOWA.

SE-MENT-OL

Agents Wanted Everywhere
Northwestern Chemical Co., Marietta, O.



F. W. Ofeldt & Sons,
Nyack-on-Hudson, N. Y.
Manufacturers of
Blue Flame Kerosene Burner,
Safety Water Tube Boiler,
Automatic Water Regulator,
Automatic Fuel Regulator,
Feed Water Heater,
Compound Steam Engines,
New Automatic Fuel Feed.
For all makes of steamers, includ-
ing White's and Stanley's. Write
for new Catalogue.

THE CLIMAX AIR COOLED MOTORS

are the best automobile motors out.
Guaranteed forever against defective
material and workmanship.
Let us tell you all about them.

Write at once for Catalogue.

CLIMAX ELECTRIC WORKS, New Salem, Mass.

ESTABLISHED 1873.
\$60 Lathe. Gap Lathes. Turret
Engine Lathes and Shapers. Screw
Cutting, Foot and Power Lathes,
Hand and Power Planers, Hand and
Power Drills, Chucks, Emery Wheels,
Outfits. Tools especially for Black-
smiths, Electricians and Bicycle work.
Catalogue Free.
SHEPARD LATHE CO.,
141 West 2d Street, Cincinnati, Ohio.

AUTOMOBILE SPRINGS

All Styles.

Made or duplicated by
TUTHILL SPRING CO.
578 Polk Street, CHICAGO, ILL.

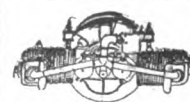
CAST IRON BRAZING easy with UNIVERSAL FLUXINE

You can solder cracked water jackets easy with
UNIVERSAL SOLDERING FLUID.

Booklet.

Universal Fluxine Co., Urbana, Ohio

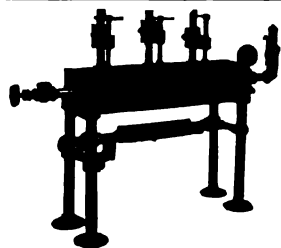
4X4 AIR COOLED MOTORS



\$80.00 each for Jan. only
Transmissions,
\$23.00 each.

Write for Catalogue.

AUTO PARTS CO., 52 West Jackson St., Chicago, Ill.



The "Boilerless" Steam Vulcanizer

Underneath the square semi-steel body is fitted our special gas burner, thus doing entirely away
with boiler for inner tube work.

Gasoline burner and tank supplied instead of gas if desired.

Furnished complete with steam gauge, safety valve, filling valve, air cock, and our well-known
nick acting clamps. **LOW COST. HIGH SATISFACTION. Immediate shipment. Write us to-day.**

WISHART-BURGE MACHINE WORKS,

64-66 SOUTH CANAL STREET, CHICAGO, ILL.

The Bowden Patent Wire Mechanism

FOR the TRANSMISSION of
RECIPROCATING MOTION
THROUGH A FLEXIBLE &
TORTUOUS ROUTE

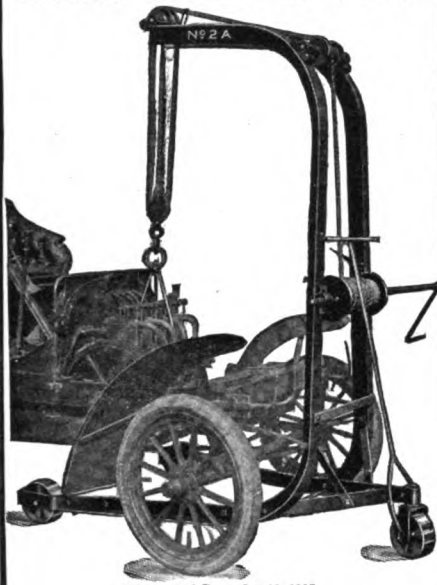
J. S. Bretz Company

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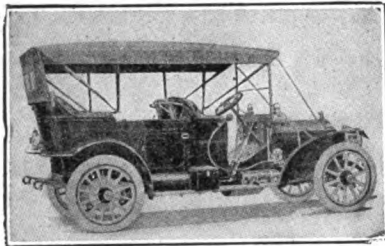


Patented December 19, 1905
See how easy it does it. Fills the bill for Automobile Factory and Garage Crane. Many of them using it. You should. Send for descriptive circular.
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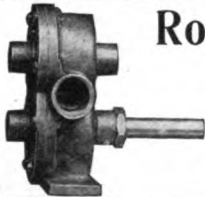
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Carriage Tops,

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BALTIMORE BUGGY TOP CO.
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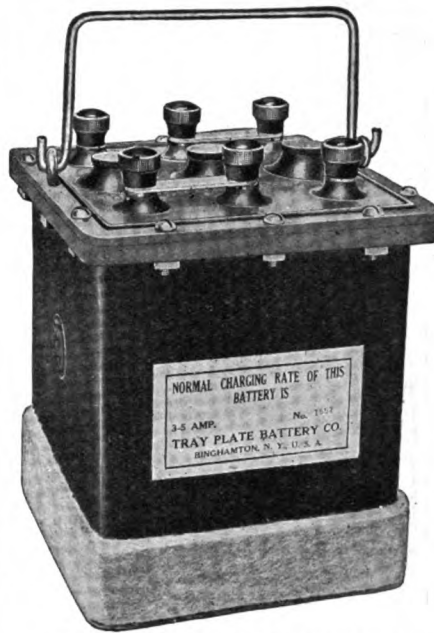
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6 Volts, 60 Amperes.
Type A, No. 660.

HIGH EFFICIENCY BATTERIES

FOR

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A GOOD FAT HOT SPARK

A BATTERY OF GREAT
CAPACITY



OVER 50% OF THE LARGEST AND BEST
JOBBER'S ARE HANDLING THIS BATTERY

LIGHT YOUR CAR OR BOAT BY ELECTRICITY

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Are you up against coil repair troubles? Then you will appreciate the **Easy Repair** feature of Cartridge Coils. Read description on page 390 of this issue. All Cartridge Types are equipped the same way and all are **easy to repair**.

Write for our Special 30 Day Offer.

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LAFAYETTE, IND.

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Inventors and Mfrs. of the **Stow Flexible Shaft**

**Electric
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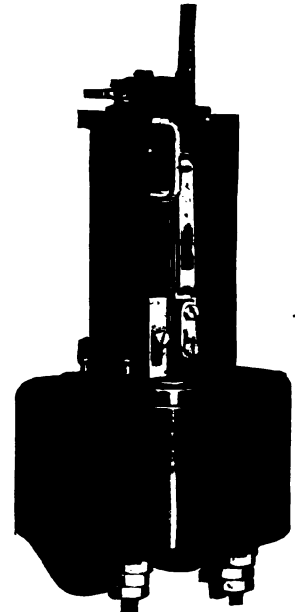
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THE "DELCO" IGNITION SYSTEM.

A decided sensation has been caused in the trade by the New "Delco" System of ignition, which has been introduced and perfected by the Dayton Engineering Laboratories Co. of Dayton, Ohio. The special points claimed for this system are as follows: It stops all sparking at preliminary contacts. It will run a car 2,000 miles on six dry cells. It stops all sparking at the commutator. It does not require constant adjustment. It makes but one spark for each explosion. It removes everything from the dash, but the switch. It stops switch troubles. It gives as much speed as any magneto, and it is claimed that there is better control at low speed. The apparatus in the Delco system includes a coil box and a relay with the suitable switches. We illustrate the Delco Relay which takes the place of vibrators, and



Delco Relay. Takes the place of vibrators and master vibrator. Delivers one spark per explosion. Runs 10,000 miles without adjustment.

CAR BUMPERS.—Those who have due regard for the welfare of their car are beginning to feel that they should be equipped with good bumpers. They protect it from the effect of collisions, and they are a safety device for lamps, mud guards, fenders, wind shields, and other accessories, and especially when you are not there to watch your car in the crowded city thoroughfares. The Standard Sales Corporation of 232 W. 58th St., New York, have put on the market a bumper which they call the "Swivel-Action." It fits all cars except the Ford Model M and the Brush. It is liable to save its price a dozen times over in the course of a year. When ordering please state the make and model of your car, so that the proper fittings may be supplied.

SCHUG ELECTRIC SPECIALTIES.—The Schug Electric Mfg. Co., 326 E. Jefferson St., Detroit, Mich., has an announcement in this issue of their electric specialties. They are making special prices to the trade and want our readers interested to write to them for catalogue and further particulars.

Subscribe to the "Automobile Dealer and Repairer," \$1.00 Per Year.

master vibrators. It delivers one spark per explosion and will run 10,000 miles without adjustment. It is interesting to know that the Delco system of ignition has been adopted by the Cadillac Company and, as we understand it, will be installed on all of the 1910 cars manufactured by this company. Every car owner and dealer who reads this publication should send at once for catalogue and full information, and they are requested to use the coupon which appears in the full page advertisement of the Dayton Engineering Laboratories Co. in this issue.

BRICTON TREADS, DETACHABLE.—It seems hardly necessary to direct attention to the three full-page announcements in this issue of the Bricton Mfg. Company of Brookings, S. D. The dealers, the repair men and the auto owners are all interested in these treads. This company wants to establish agencies all over the United States and there is in their advertisement a coupon, which can be cut out and mailed to them by every one who is interested. With your tires equipped with these treads the manufacturers say that you are in condition to cope with slippery or icy roads without fear of getting into trouble. The roughened steel studs take a firm grip on an icy thoroughfare. But read their announcements and write to them.

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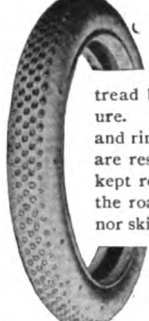
PYRAMID ALUMINUM FLOOR COVER.—This cover is manufactured by the Factory Sales Corporation, 1436 Michigan Ave., Chicago, Ill., and it is said that it will make an old car look like a new one. It is claimed to be a durable, clean, attractive and economical floor cover for automobiles, carriages, and motor boats, but if you are interested write for Circular "F31", which gives full particulars with prices and it will be promptly forwarded to you.



LEARN SPANISH IN 3 MONTHS

Send for our interesting booklet "Spanish in Three Months" and reasons why you should learn Spanish. Graduates assisted to remunerative positions at salaries from \$1,500 to \$5,000 per year. The only exclusive Spanish Correspondence School in the World.

DESEE SCHOOL OF SPANISH
527 Sedgwick Bldg., Wichita, Kansas, U.S.A.



The HORSE-SHOE TIRE

is made to wear indefinitely by replacing worn horse-shoe rivet heads which are renewable. The tread being thus protected will not puncture. We guarantee against blow-outs and rim-cuts. The HORSE-SHOE TIRES are resilient and when our rivet heads are kept renewed, are non-skid and safe on the roads. A tire that will not puncture nor skid, and the mileage and wear is up to you. Send for Illustrated Booklet giving full particulars.

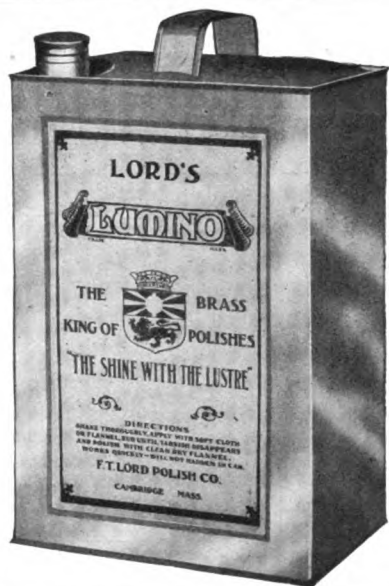
BEEBE-ELLIOTT CO.,
103 Beebe St., Racine, Wis.

NO JOY RIDES WITH A BONGARTZ AUTO LOCK.—One of the most useful inventions for car owners, that has been brought to our attention is the Bongartz Auto Lock. With this device it is impossible for a chauffeur, or any other person, to use a motor car without its owner's knowledge. A snap of the lock and no one can use your car until unlocked by you. The car can be pushed around the garage, but cannot be driven, until you turn the key in the lock. The lock costs only \$3, and this is certainly a small price to pay for the assurance that your automobile is safe from theft, no matter where you leave it. It is quickly attached, fits any make of car and lasts a life time. For sale by the best supply houses, but you are requested to write for an interesting descriptive circular to the Bongartz Co., 57th St. and Broadway, New York City. In writing please mention this journal.

AN AUTOMOBILE WASH BRUSH.—A new announcement will be found in another column regarding a convenient wash brush, for use on an automobile. This brush will get into the crevices, which it is impossible to reach with a sponge, and the party doing the washing keeps his hands free of water. The brush is made of the very best of soft hair. The water passes through the center of the brush and throws an ample supply of water on the car. The brush can be removed from the handle and used as a sprayer for the garden. It is manufactured by the I. J. Smith Mfg. Co., 4283 Park Avenue, New York City. This company also manufactures an overhead washer, both plain and with electric lights and also with automatic water cut off. Send for Catalogue "A," which will give full particulars regarding all the useful articles manufactured and marketed by this company.

THE AUTO TIRE REINFORCEMENT.—In this issue will be found the announcement of the Auto Tire Reinforcement Co., "E" 7th Street, Auburn, Ind. Their reinforcement material reinforces the whole tire from the inside and they claim it is entirely practicable and a perfect success. It is made of three or four plies of frictioned fabric vulcanized and shaped to fit the whole inside of the tire. It prevents blow outs, rim cuts and punctures, and it is claimed adds many miles to the service of any tire. It can be applied by any one in a few minutes. Samples of materials used with catalogue and prices will be sent free of charge to any one writing for them.

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To Garage Owners and Dealers LORD'S LUMINO

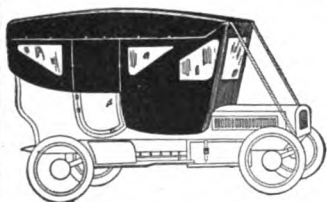
"The King of Brass Polishes"

LUMINO is a white creamy liquid and will not readily settle or harden in the can. It is positively **guaranteed** not to scratch the smoothest surface, and metals polished with it will hold their lustre for a long time.

To any **GARAGE OWNER** or **DEALER**, or **REPAIR MAN**, who will send his business card, or address on letter head or bill head, we will send a **Handsome Celluloid Souvenir Pen and Pencil Combined**, **FREE OF CHARGE**.

Write **at once** for special terms.

Address **F. T. LORD POLISH CO., 37 Hovey Ave., Cambridge, Mass.**



AUTO TOPS, \$25.00

Auto Bodies in the White, Painted or Trimmed. Write for Auto Catalogue and quotations.

BUOB & SCHEU,

Wind Shields and Dust Covers.

No. 1000 Broadway, Cincinnati, Ohio.

Special Request

IN writing to advertisers for circulars or information, you are earnestly requested to mention in each case that the advertisement was seen in the "Automobile Dealer and Repairer." By so doing you will confer a favor on both publisher and advertiser

Auto Directories Co., Inc.

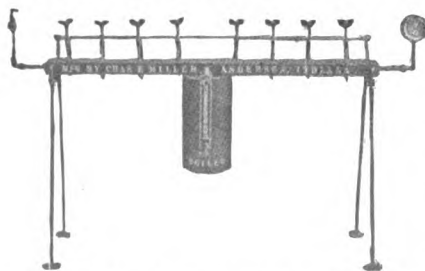
CERTIFIED COPIES OF THE OFFICIAL LIST OF AUTO OWNERS, CHAUFFEURS, DEALERS, GARAGES, MANUFACTURERS AND JOBBERS IN THE U. S. AND CANADA. ALSO MOTOR BOAT OWNERS

Offices, 1717 Broadway

NEW YORK CITY

'Phone 858 Columbus.

MILLER'S INNER TUBE VULCANIZER.

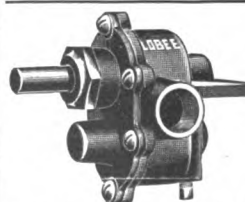
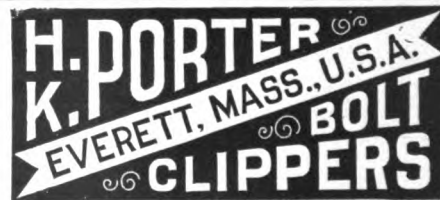


175.00 each. Also special round molds with flush joints for splicing inner tubes. We do all kinds of tire repairing and carry a large stock of tires at reasonable prices. If further interested in vulcanizers write for catalog and special proposition.

CHAS. E. MILLER, Anderson, Ind.

Has a tube plate 54 in. long and 4 in. wide with plain surface highly polished, complete with stand, 12 flue boiler, gas or gasoline burner, water glass, pop valve, steam gauge, 8 clamps and two molds for curing the treads of casings, price \$30.00. Tube plate only with steam gauge and 6 clamps, price \$10.00.

We also manufacture various other vulcanizers. No. 1 and No. 2 adjustable sectional vulcanizers, complete with boiler, \$35.00 each. Bicycle vulcanizers, \$7.50; Motor cycle vulcanizers, \$12.50; Tread Rollers, \$12.00; Kettles, \$115.00; Power wrapping machines,



If you want good circulation on your automobile, launch or motor boat, use a **LOBEE PUMP**. Write us at once, and we will tell you why, and send price list. Address **LOBEE PUMP AND MACHINERY CO., 14-18 Erie St., Buffalo, N. Y.**

Subscribe to the "Automobile Dealer and Repairer," \$1.00 Per Year.

Please mention the Automobile Dealer and Repairer when writing to advertisers.

JUST OUT!

WRITE for our new 24-page booklet, "USE AND CARE OF MAILING LISTS." If you are at a loss to plan your Fall advertising campaign, or if you are hesitating between magazine and direct advertising, this booklet will put you on the right track.

If you are at present using Mailing Lists, we may be able to give you some new ideas as to the expeditious and economical handling of them. The book is full of useful suggestions for the advertising manager. It also gives a synopsis of all the state registration laws.

We Make No Charge. The book is free to the advertising manager. We only ask that you write us on your firm's stationery, as we have only a limited number of the books and we do not care to waste any copies.

Automobile Advertising Company,

422 State Life Bldg., Indianapolis, Ind.

We will be glad to instruct you as to the cost and how to install a card filing system, or to figure out the cost of a circularizing campaign.

GOES INSIDE AND OVER BOTH BEADS.



BLOW-OUT PATCH EQUAL TO AN EXTRA TIRE.

Because twice as quick and just as safe. THE ONLY PATCH made exactly like a tire, of fabric stretched, vulcanized and tested under 250 pounds pressure, so WILL NOT BULGE.

INNER SHOE TIRE CO., Grand Rapids, Mich.

C. O. T. TIRE PATCHES



Mr. Dealer and Owner: Have you ever thought that to make a good repair you have got to have the correct article? You can get it in our Patches. They are made to absorb the cement, and have a heavy center and feather edge. Can be obtained from all jobbers.

**C. O. TINGLEY & CO.,
RAHWAY, N. J.**

Please mention the Automobile Dealer and Repairer when writing to advertisers.



Don't Lose This Profit!

Prest-O-Carbon Remover does a better job than scraping out the carbon, is better for the engine, quicker and easier.

It saves money for your customer, and yet makes more money for you.

PREST-O-CARBON REMOVER

Consumes little shop time and labor Charge your customer \$3 to \$5 for a thorough job. There's good money in this.

And don't forget that your customer will have his engine cleaned often, if the price is right.

The same liquid is used over and over again—little waste or expense to you. Someone in your town is going to attract profitable trade on this!

Order some of this liquid, and write us for full information. Retail prices: Gal., \$3.75; Half Gal., \$2; Quart, \$1. In cans. Guaranteed.

**The Prest-O-Lite Co., 251 East South St.,
Indianapolis, Ind.**

Branches at New York, Boston, Philadelphia, Cleveland, Minneapolis, Omaha, Dallas, Los Angeles, and San Francisco.

JUST WHAT YOU WANT!



DON'T METAL POLISH YOUR

life away, but finish the brass parts of your auto with Stay Shiny—The Marvelous Tarnish Preventative, and have them look like gold plate all the time. Saves hard, dirty work, time and money. One invisible coating preserves original high polish and absolutely prevents tarnish on lamps, radiators and trimmings for months, under heat, rain, and all weather conditions. Easily applied, easily removed when desired and non-injurious to metal. Fully guaranteed. Price \$2.00 Pint can, with brush. Express Prepaid. Lasts a year. Thousands of auto owners are delighted users of this long looked for article. Garages and Agents make big, easy money selling Stay Shiny. Write me right now.

**F. H. SCHMOEGER,
Sterling, Ill.**

Try Dixon's Motor Graphite

Just try it once and see how much easier, smoother and more quietly your car will run. Dixon's Graphite saves time and trouble. Write for free sample, G-184.

**Joseph Dixon Crucible Company,
JERSEY CITY, N. J.**

Let SHALER

Help You
Put the
Money
in the
Cash
Drawer

THIS
SHALER

ELECTRIC VULCANIZER

Is the very best investment you could make for your Garage, primarily because it is a rapid money-maker, and will more than pay for itself in one week.

This statement is backed up by the fact over **three-fourths** of the garages in the United States are making a **SHALER ELECTRIC VULCANIZER** bring in a large part of their revenue.

It heats in a very few minutes, consuming less than one cent's worth of current per hour. The heat is automatically regulated so that there is no danger of overheating, although it does not have to be watched, and while one tire is being vulcanized, another can be prepared.

Auto Owners, write for Tire Handbook.



Write for Full Description

C. A. SHALER CO., Mfrs.

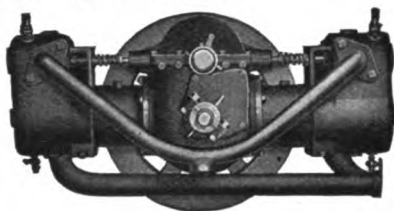
Box X

Waupun, Wis., U. S. A.

The Beilfuss Double Opposed Motor

Makes a hit wherever used on account of its compactness.

Can be placed in any car from the small Olds Runabout to the larger sized cars.



Made in two sizes:
10-12 H. P. and 18-20 H. P.
Water Cooled.

Write to day for Circular and Prices.
Simplest and Strongest Motor Built.

Beilfuss Motor Co.
LANSING, MICH.

Please mention the Auto Dealer and Repairer

PROTECT YOUR NEW TIRES. REPAIR THE OLD ONES.



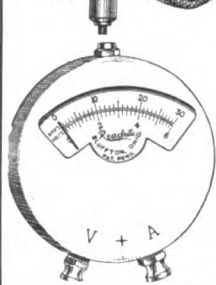
Tires
Will Last
Forever

Steel Link
Bands

Hooks to
Rim

You can fix Blowout quick. If tire is completely covered by these clasps you cannot have Blowouts, Punctures, Rim Cuts or Wearing off of tire. (Any old tire is good. How can it get away if encircled by steel?) As flexible as ever. Anti Skid.
KIMBALL TIRE CASE CO., 174 Broadway, Council Bluffs, Ia.
Agency for Indiana, 417 Mass Ave., Indianapolis.

Sold by
Jobbers
and
Dealers



READRITE POCKET METERS

Noted for
**Accuracy, Durability
and Permanency.**

Written guarantee for one year
with each meter.

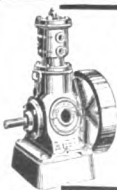
Ammeters, \$2.50

Volt-meters, \$3.00

Volt-ammeters, \$3.50 & \$4.00

Write for Circular and
Discount to Trade.

Read-Rite Meter Works
18 Main St., Bluffton, O.



Equip Your Garage with the G-R AIR PUMP

Does more work with less power than any compressor made. Enclosed, self-oiling and very simple. No stuffing boxes, gears or cross heads. Write at once for descriptive Circular and Price.

GARDNER-RIX GOV. CO., Quincy, Ill.

"Knipe" Pat.

Ball Bearings.

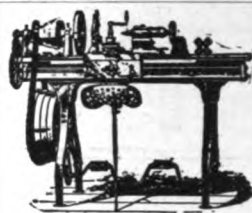
Steel

Brass

Balls.

1/4 Inch Shaft and Up.
No Fitting. Just Push Them On.
10 Cents in Stamps for Sample.

PRESSED STEEL MFG. CO.,
454 The Bourse, Phila., Pa.



THE BARNES LATHE

9' swing
11' swing
13' swing

For Repair Work our No. 13 Lathe is right; has 13' swing, auto cross feed, length of beds from 5 to 10 feet long; furnished with counter-shaft or foot-power.

SEND FOR LATHE CATALOG.

W. F. & JOHN BARNES CO.

206 Ruby St., - - - Rockford, Ill.

GASOLINE STORAGE UNDERGROUND OUTFITS

\$12.50, \$25.00, \$35.00 and up.

GOOD GOODS. LOW PRICES.

LUBRICATING OIL TANKS ALSO.

\$3.50, \$5.25, \$6.50, \$10.00 and up.

Cabinets, \$15.75 to \$100.00.

Oily Waste Cans, meeting insurance requirements.

Accurate Measures, and good funnels.

Kamp Kook's Kits that please tourists.

Ask Your Dealer. Send for Catalogue.

MANUFACTURERS SINCE 1869.

F. CORTEZ WILSON & CO.,

247 Lake Street, Chicago, Ill.

NEW LEATHER IN YOUR AUTO FOR \$1.00

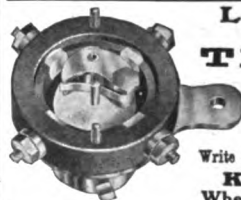
Enamelac Leather Finish in Five Colors.

Will restore the color and finish, or change the color of leathers and imitation leathers that have become worn, soiled and discolored. Is water-proof. Sufficient amount to refinish the leather in large car for \$1.00.

Ask us for our attractive dealers' proposition

THE ENAMELAC VARNISH COMPANY

108 MAIN STREET RACINE, WISCONSIN.



LONG BROS.

Manufacturers of

TIMERS

BUICK SPECIALS

Mica and Porcelain

SPARK PLUGS

Built for Service

Write at Once for Booklet and Prices

KOKOMO, IND.

When You Buy, Buy the Best

THE CLEVELAND TWIST DRILL CO.

SETS
OF
DRILLS

TRADE
MARK

SETS OF
TAPER
PIN
REAMERS

New York

FOR THE GARAGE
Cleveland

Chicago

PACKARD CABLE



Will Make That Repair Job **SURE.**
Are you getting our pretty Monthly Calendars?
THE PACKARD ELECTRIC CO., Warren, Ohio.



TRY IT
We mean our superior goods
against others

"ERICKA" Hand Soap

It's a Fine Hand Soap

"ERICKA" Auto-Car Soap

Shineaul Metal Polish

At All Dealers

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PARTIAL CONTENTS:

✻ ✻ ✻

A Rotary Motor—Something New and Novel.
 Common Mechanical Troubles and How to Remedy Them.
 The Cooling Circuit—The Baneful Effect of Carbon.
 Leg Room—How the Steering Gear Affects It.
 Simple Vulcanizing—Pointers for Home Work.
 Wire or Wood Wheels and Their Strength.
 How to Solder—A Useful Thing to Know.
 Trouble Department—Puzzling Questions Asked and Answered.
 Etc., Etc.

**The Only Sane,
 Safe and Sure
 Motor Shoe
 Protector---Not a
 Tread Protector,
 but a Tire
 Protector.**

**Made of Steel---
 No Leather to
 Come unglued or**

Stretch out of its Rivets, or Burn the Rubber Beneath it.



(a.) Our patented supplementary Anti-Skid Treads made of glass-hard steel will wear five thousand to ten thousand miles, and when worn off may be replaced with new ones at a cost of ten cents each.

(b.) Main tread plate made of chrome nickel steel with all edges turned away from the rubber. Cannot wear out as it does not come in contact with the road surface.

(c.) Link-plates made of best chrome nickel steel.

(d.) Our patented rim locks that attach themselves with absolute security to the rim.

(e.) Strongest open Hearth Steel links that hold all parts securely together, making 880 smoothly sliding joints, or hinges, that retain the entire resiliency of the tire, yet do not wear, from the fact that the weight of the car loosens or OPENS instead of bringing pressure upon them.

Place this on your weak, worn tire, and you will find the combination gives you the best motor shoe on the market. The perfect resiliency of the pneumatic shoe remains, but the mileage is greatly multiplied, and the inconvenience of tire troubles is gone—in fact YOUR OLD SHOE WILL NOW OUTLAST ANY THREE NEW ONES. SOLD UNDER AN IRON-CLAD GUARANTEE. No need of “laying up” your car in WINTER, or BUYING NEW TIRES IN SPRING.

Send this Coupon at once for our book of “Questions and Answers,” and our

SPLENDID INTRODUCTORY OFFER

that will make mighty interesting reading—just at this time when the Rubber Trust has seen fit to again “put the screws” to its customers—just at this, the very DAWN of the cold season, when tire troubles are so **particularly** unwelcome.

THE DAVIS ROBE CO. (Inc.)
 Champlain Bldg., Chicago, Ill.

DAVIS ROBE CO., Champlain Bldg., Chicago, Ill.

Send immediately your book of “Questions and Answers,” and your SPECIAL INTRODUCTORY OFFER. I have not seen your tire protectors ON A CAR here.

My Car is a..... H. P.....

using..... tires and..... rims.

Size of tire.....X.....

Name.....

Address.....

A. D. & R.

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Live Specialties



**GUARANTEED
NOT
TO RATTLE.**

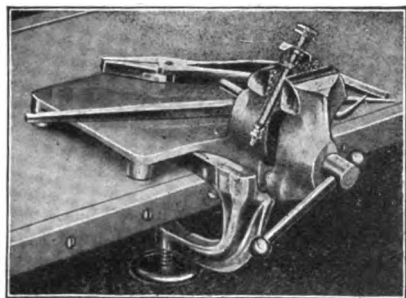
Made of
Brass Tubing.

Our aim is to make the best and not the cheapest wind shield on the market and we are catering to high class trade only.

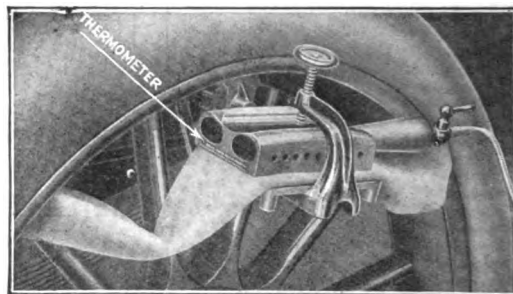
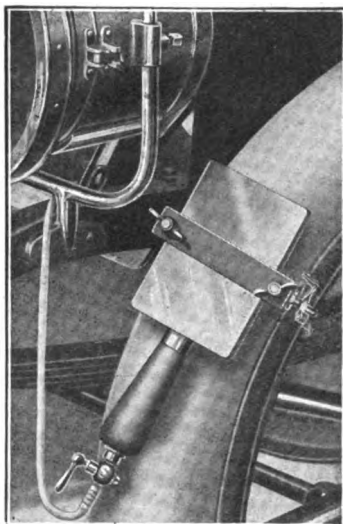


TIRE TROUBLES ENDED

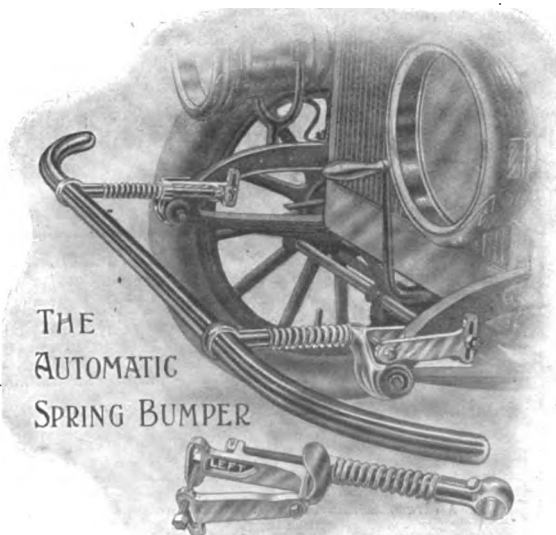
Economy Vise and Vulcanizer



Connect to Gas Tank or Generator
anywhere you happen to be.
Guaranteed in every respect.



Costs practically nothing to operate.
Any one can do perfect work.



THE
AUTOMATIC
SPRING BUMPER

"THE AUTOMATIC" Spring Bumper

No Holes to Drill
No Bolts to Change

WE HAVE IT AT
LAST. The great feature of our Bumper over all others is that it can be put on to any car WITHOUT DRILLING any HOLES or REMOVING the SPRING HANGER BOLT.

Send for our Complete
Catalogue of Live Specialties

Emergency Mud Hook For Pneumatic Tires



The farmer will charge the price of two sets to pull you out of one hole.

GARAGE EQUIPMENT MFG. CO.

402 Florida St., MILWAUKEE, WIS.

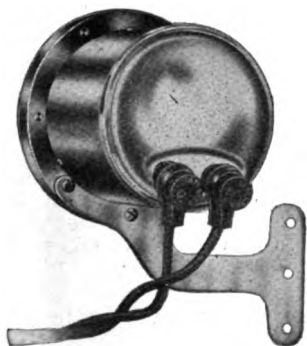
KLAXONET



FOR RUNABOUTS AND SMALL CARS

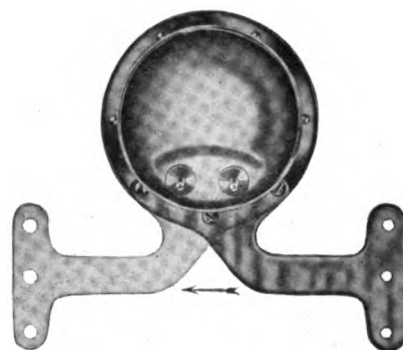
Motorists generally are beginning to realize the unappropriateness of *musical* notes for *warning* purposes—it is like singing a cry of “Fire!” The musical note never gets attention or clears the road half so quickly as a sharp, discordant tone.

The harsh blare of the KLAXON is conceded to be an ideal warning for automobiles; but for small cars it is often considered too powerful. To meet the demand for smaller *size* without sacrifice of *quality* we have brought out the KLAXONET.



It is a miniature of the KLAXON, operating on the same principle but of slightly simpler construction. All the essential elements—motor, diaphragm, hardened button and toothed wheel—are there. It is attached even more readily than the KLAXON, and it uses only $2\frac{1}{2}$ amperes on a 6-volt current—dry cells or storage.

Its note has the distinctive metallic KLAXON tone—not so loud, but higher in pitch. In size, tone and price, the KLAXONET is the best signal ever devised for cars up to about 15 h.-p.



SHOWING HOW BRACKET IS REVERSED TO FIT RIGHT SIDE OF DASHBOARD.

===== THE PRICE IS \$20. =====

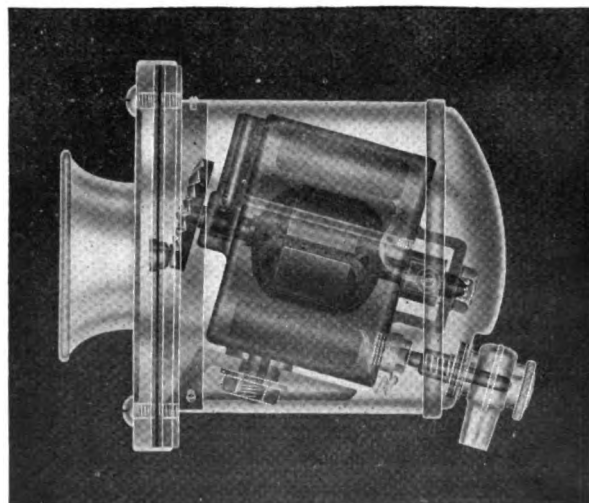
LOVELL-McCONNELL
MFG. CO.,

Manufacturers,
Newark, New Jersey

THE KLAXON
COMPANY

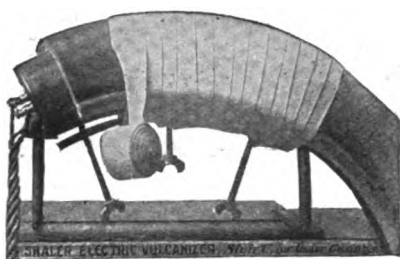
Sole Distributors for U. S. A.

1 Madison Avenue, New York



GHOST VIEW SHOWING MOTOR, TOOTH WHEEL AND DIAPHRAGM.

Please mention the Automobile Dealer and Repairer when writing to-advertisers.



THIS ELECTRIC SHALER VULCANIZER

HAS SIMPLIFIED TIRE REPAIRING

SINCE the pneumatic tire came onto the market there has been no way for the average garage or repair man to mend a blow-out, on account of the complicated process and great expense. The Shaler Electric Vulcanizer, Type C, has simplified the process and reduced the expense so as to place the means of mending any blow-out within the reach of every garage and repair man.

You don't have to cut off and throw away a lot of good rubber from the outside of the tire.

You don't have to peel off and step down the canvas from the outside of the tire.

You don't have to add a lot of new canvas to the outside of the tire where it will blow off.

You don't have to rebuild a new tread with new rubber at great expense.

You don't have to make two weak joints in the casing that will surely blow out.

You don't have to send a tire out knowing it will blow out in one of the two joints you have made.

You don't have to depend on the uncertain air bag for your pressure while vulcanizing.

You **do** have to fill in the blow-out with a small amount of new rubber.

You **do** have to add about half as much new canvas to the inside of the tire, where it belongs.

You **do** make the tire stronger at the point of repair than at any other place.

You **do** by the patented tension screws and tape make the new canvas adhere to the inside of the tire with an enormous pressure, making it form an integral part of the tire.

You **do** know that in order for the tire to blow out the new patch will have to blow out through the old hole.

You **do** know that when you send out a repair it will long outlast the rest of the tire.

**C. A.
SHALER
CO.,
Waupun, Wis.,
Box X.**

Send free copy of
Garage Hand-book with
description of and best dis-
counts on SHALER ELEC-
TRIC VULCANIZERS.

We have

Alternating Current ☐

Direct Current ☐

No Current ☐

Check your current.

Name.....

Address.....

.....

C. A. SHALER CO., Mfrs.,

**Box X,
Waupun, Wis., U. S. A.**

Please mention the Automobile Dealer and Repairer when writing to advertisers.

Woodworth Treads

REASONS FOR TIRE PROTECTION

It is a fact that the great bulk of all delays and annoyances incident to motoring are caused by some form of tire trouble

The weight of the car, with its occupants, rests on a cushion of air and rubber, and any device which tends to prevent the destruction or wear on the latter is worthy of intelligent consideration.

WOODWORTH TIRE PROTECTORS

Are as necessary a part of an automobile equipment as the tires themselves.

BECAUSE they prevent punctures.

BECAUSE they will not allow the tires to become worn or cut on the outside surface.

BECAUSE the projecting steel studs reduce the danger from skidding on icy or slippery roads.

BECAUSE they will not chafe or heat the tire.

BECAUSE they can be easily adjusted or removed in a few minutes.

BECAUSE they will not allow moisture or dirt to penetrate the rubber and rot the fabric.

BECAUSE they lengthen the life of the tire from 5 to 6 times.

BECAUSE they are no detriment to the appearance of the tire itself.

BECAUSE tires using our treads are good for from 25,000 to 50,000 miles.

LET US TELL YOU ALL ABOUT IT.

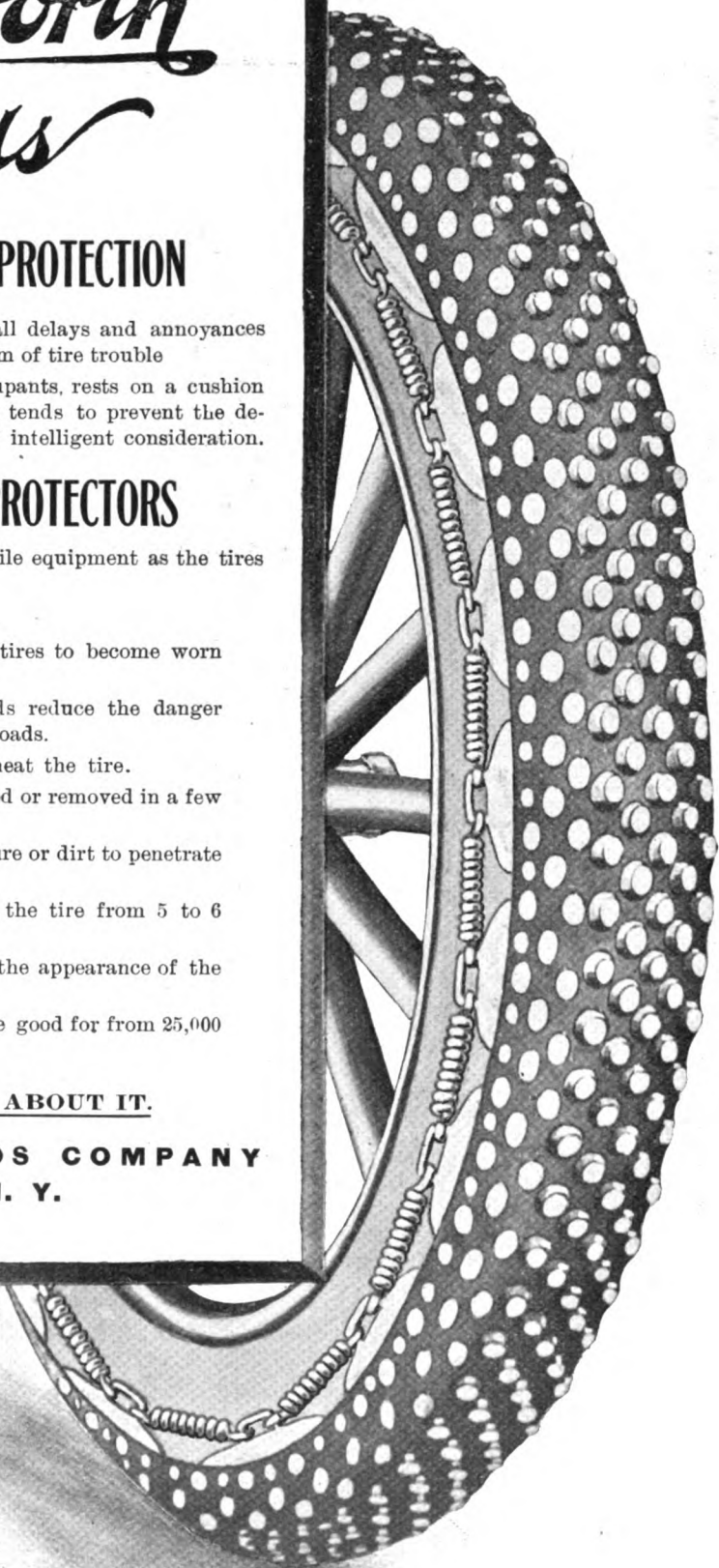
LEATHER TIRE GOODS COMPANY
Niagara Falls, N. Y.

Leather
Tire Goods
Co., Niagara Falls,
N. Y.

Please send 1910 Catalogue
and prices to

Mr.....

Auto Dealer & Repairer, Jan. '10.



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The Two Best Ways Of Riding on Air

Right Now the Goodrich Metal Stud Tire
is the seasonable tire for city users of automobiles.
It affords excellent traction on slippery, greasy
pavements.
Write for special literature.

THE B. F. GOODRICH COMPANY
AKRON, OHIO

COPYRIGHT 1909. B. F. GOODRICH CO. AKRON, O.

To The Man Who Uses or Sells Auto Tools

Buffum Tools for automobile work represent in their design the best ideas of the most expert mechanics.

Some little mistake in a detail of the design of a tool makes *all the difference in the World*. Buffum tools are *right*. We know that, for several very good reasons. One indication is the increasing demand from places where we have already sold large quantities.

These tools in range cover *all* operations in auto construction and repair.

Buffum tools are known to give the best results and service. The name "Buffum" guarantees the *grade* of the tool. High grade workmen *insist* on having Buffum tools.

Get the Buffum Catalog

Just fill out the coupon below, enclose it in an envelope and send it to us and we will forward you by return mail our catalog of automobile tools.

This catalog is *very good* for reference whenever you are in the market for tools, as it is complete as to description and well illustrated. We desire to place one in the hands of every mechanic and every purchasing agent in the automobile field. It is strong on—

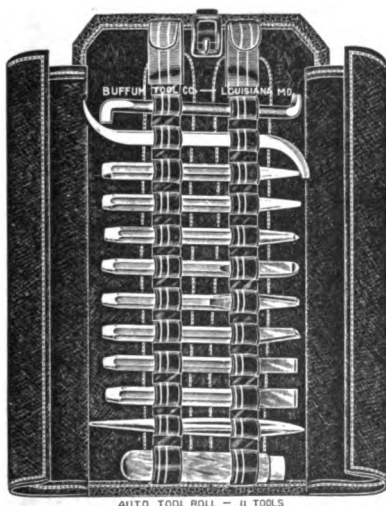
Chisels of all types, Punches, Screwdrivers, Cotter Pin Tools, Auto Bearing Scrapers, Bearing Scraper Sets, Tool Sets in fine variety, Gad, Lip and Tap Tongs, Removing Tools, Packing Irons, Carbon Scraper Sets, Off-Set Screwdrivers, Pin Punches, Blunt End Cold Chisels and Calking Irons.

No tool leaves our factory without undergoing *careful* inspection. The Buffum standard of excellence is extended to *every* item of our production. You can order from us understanding that we stand behind our goods.

All leading dealers sell Buffum Tools. Write now for the catalog.

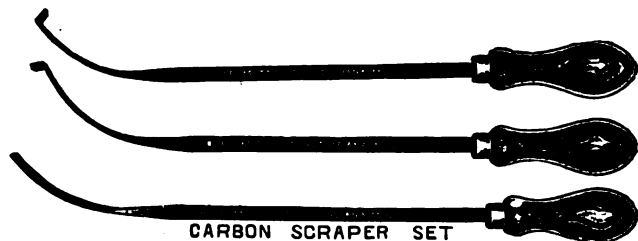
BUFFUM TOOL CO., Louisiana, Mo.

C. S. LAWRENCE, Eastern Sales Agent,
117 Chambers Street, Telephone, 2063 Worth.



Automobile Tool Roll.

Twelve High-Grade Tools in Roll of Imitation Leather, Cloth Lined.....\$3.50
This is a famous value. The set takes care of most work arising in general automobile repairing. It includes one Special Pin Punch, one Plain Punch, one Center Punch, one Diamond Point Chisel, one Round Nose Chisel, two Flat Cold Chisels, one Bearing Scraper, one Off-set Screwdriver, one Cotter Pin Tool and one Tool Handle.



Standard Carbon Scraper Set.

Specially made to scrape carbon from tops of cylinders and pistons and the exhaust parts of gas and gasoline engines. Carbon on inside of cylinders causes pre-ignition and engine to overheat, while carbon in exhaust parts reduces power often over one-half. Price of set of three pieces packed in a pasteboard box.....\$1.00

SPECIAL COUPON—FILL OUT AND MAIL.

BUFFUM TOOL COMPANY,
Louisiana, Mo.

Gentlemen:—Kindly send me catalog 1, Section A, showing auto tools and tool sets.

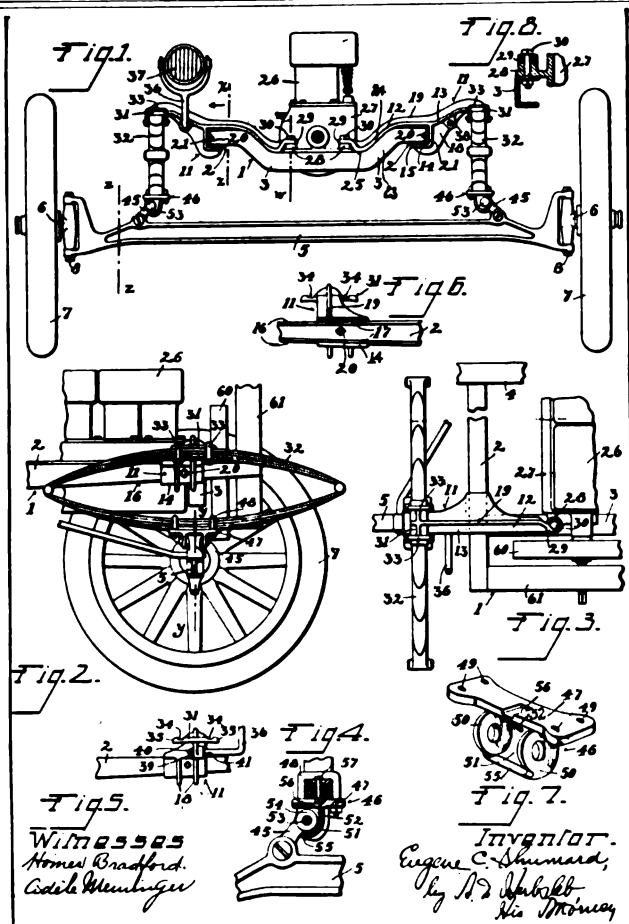
Name.....

Occupation.....

I buy my tools from.....

Address.....

Town and State.....



Reproduction of Patent, Showing Detail of Parts, and the Manner of Attaching.

SHUMARD'S Elliptic Spring Outfit "FOR RUNABOUTS"

This outfit is used to replace the half-elliptic single front spring commonly used on low priced runabouts.

In due respect to the makers of these cars we do not mention the name of any particular car, but we will forward full particulars upon request. A letter of inquiry will receive our immediate attention. Please state make and model of car when answering ad.

THE SPECIAL MOTOR VEHICLE CO.
Cincinnati, O.

THE NEW 1910 MODEL OF THE

"Ideal" Lawn Mower Grinder



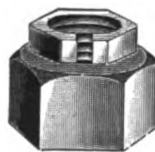
"You Grind It as You Find It."

Grinds the Reel Knives to fit the straight blade, even if the latter is bent and out of shape—the most important feature of lawn mower sharpening. Has 5-in. ball-bearing grinding wheel, babbitted bearings, twice as easy running as any other. Grinds either right or left-hand mowers perfectly in fifteen minutes without removing ratchets or wheels. We are the originators, and seven years' experience has shown us how to make them perfect. Nearly 4,000 now in use.

Send for circular giving full information and prices. WRITE TO-DAY.

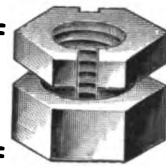
The Heath Foundry and Manufacturing Co.
(Successors to The Root Brothers Company)
Plymouth, Ohio

A NECESSITY ON AUTOMOBILES !!!



ORIGINAL.

What?



IMPROVED.

COLUMBIA LOCK NUTS.

They Will Not Shake Loose.

A LOCK NUT, NOT A NUT LOCK.

Let us send you one without charge to fit that bolt you had trouble with yesterday.

What Size Was It ???

Our "Green and Yellow" booklet tells "WHY" nuts shake from bolts.

What a comfort to ride in a car when you are sure every nut is tight on frame, engine and steering gear.

Try us and tell your friends.

COLUMBIA NUT AND BOLT CO., Inc.,
BRIDGEPORT, CONN.

Please mention the Automobile Dealer and Repairer when writing to advertisers.

ANOTHER CLEAN SWEEP

At The Garden and Palace Shows Combined, for

"Firestone" TIRES. and DEMOUNTABLE RIMS

FIRST in Tires, total equipment on cars exhibited, 76- $\frac{1}{2}$ sets.

FIRST in Non-Skid Tires on American-made cars exhibited, 102 tires.

FIRST in Solid Tires, with more than twice as many Firestone Side-Wire Tires as nearest competition.

FIRST in Demountable Rims, with more Firestone Demountable Rims exhibited on cars than any other make. More manufacturers showed Firestone as 1910 equipment than all competing makes combined.

FORECASTING ANOTHER YEAR OF STILL GREATER FIRESTONE POPULARITY.

Firestone Tire & Rubber Company, Akron, Ohio

**"AMERICA'S LARGEST EXCLUSIVE TIRE MAKERS"
BRANCHES, AGENCIES AND DEALERS EVERYWHERE**

NOTE:

In justice to any other published reports which may not agree with the above in every respect, we wish to add that this count takes into consideration only the original equipment as the cars reached the floor of the Show. We consider this basis the only accurate one on which to judge the manufacturer's preference.



**CHAMPION
Magneto Special**

\$1.50 All Sizes

\$1.75 with Champion
Terminal

Heavy bar electrode cannot burn or warp
Gives Splash Spark so effective on magneto
Positive setting of points cannot change under heat in cylinder



**CHAMPION
Two Point Magneto**

\$1.25 All Sizes

Will overcome absolutely pre-ignition caused by overheated spark plugs

Especially recommended for use on Pierce-Arrow, Pope-Hartford, Stevens-Duryea, Peerless, Corbin and Columbia cars



**CHAMPION
Regular**

\$1.00 All Sizes

The highest quality porcelain procurable
Center-wire firmly cemented and baked in
No chance for leak
Gasket construction protects porcelain perfectly
Nickel points cannot corrode, oxidize or carbonize



**CHAMPION
Mica**

\$1.00 All Sizes

Same accurate workmanship as in all other Champion plugs

Mica core guaranteed against short circuit for one year

Only clear India mica used



**CHAMPION
X**

75c All Sizes

Best grade porcelain
Core can be dissembled

Gasket construction similar to that of regular Champion

Has no equal on the market for the price



**CHAMPION
Motor Cycle**

\$1.00

Not a cut-down automobile plug, but designed expressly for motor cycle use

Meteor points for use with Magneto or coil
Soot proof chamber
Absolutely tight on compression

Will stand any heat or weather conditions

HALF PRICE OFFER

We offer these plugs to you at *one-half* above prices, if coupon attached is sent with remittance *within thirty days*. Not over one dozen plugs to one person. Send coupon and money *now*. Plugs positively guaranteed. Mark cross opposite thread and type wanted.

Genuine Champion Plugs manufactured only by

THE CHAMPION COMPANY

37 Whittier Street, BOSTON, MASS.

HALF PRICE COUPON.

Please send, postage prepaid, plugs as here specified at *one-half* regular prices quoted in this ad. Enclosed find \$..... to cover.

Quantity..... Thread..... Type.....

Name.....

Address.....

A. D. & R. Name of Car.....

Empire Tires

WEAR LONGEST

EMPIRE TIRE COMPANY

Branches and Agencies in all the Leading Cities

Main Office and Factory, TRENTON, N. J.



**K & W PATENT
RELINERS are so
successful that Tire
Experts believe we
have solved the
TIRE PROBLEM.**

Milwaukee, Wis., Aug. 16, 1909.
Gentlemen:—Enclosed please find order for fifty of your Reliners. Within the past three months we have used about three dozen of these Reliners, and up to date they have given excellent service. We have not received one complaint in this course of time.

Yours truly,

Milwaukee Tire Repair Co.

**EASILY INSERTED. PICTURE
SHOWS ONE IN SERVICE. "Write
FOR OUR PROPOSITION, ETC."**

K & W MFG. CO. Ashland, Ohio.



**K&W RELINER
BEFORE
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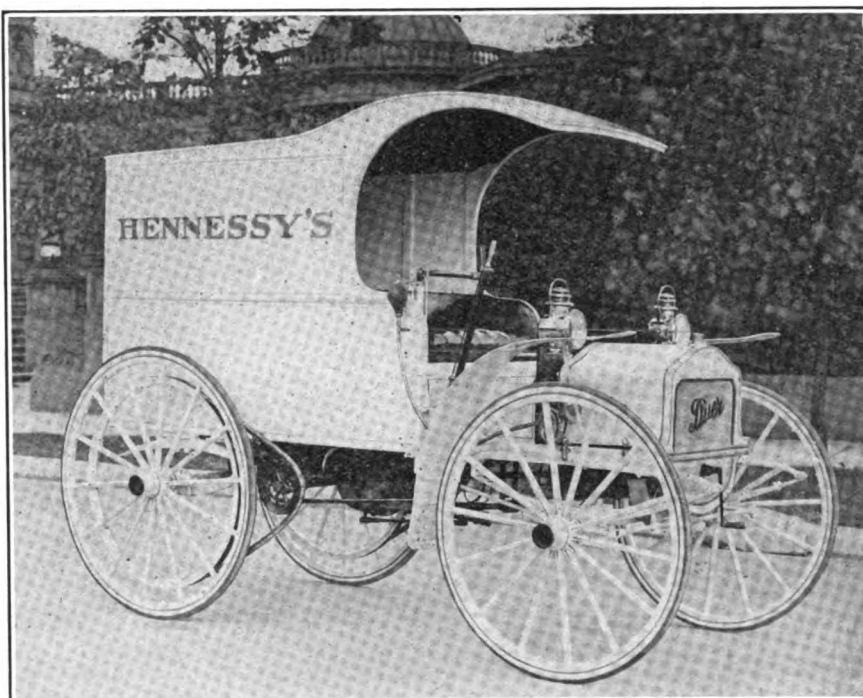
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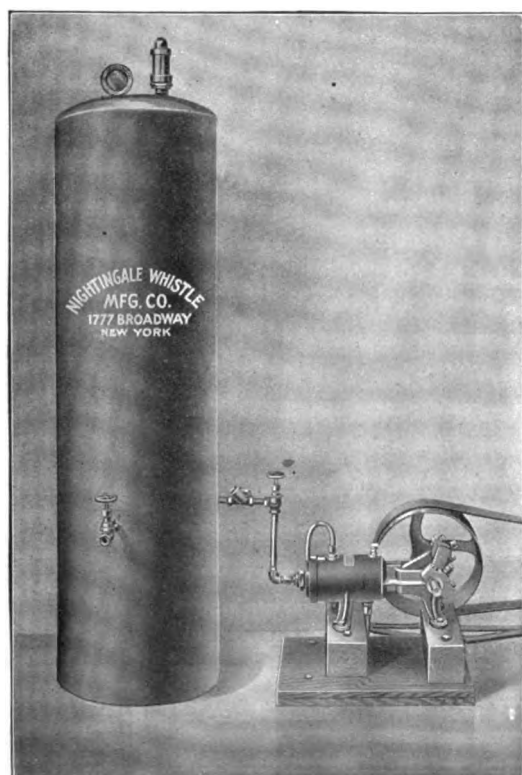
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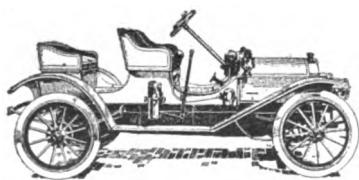
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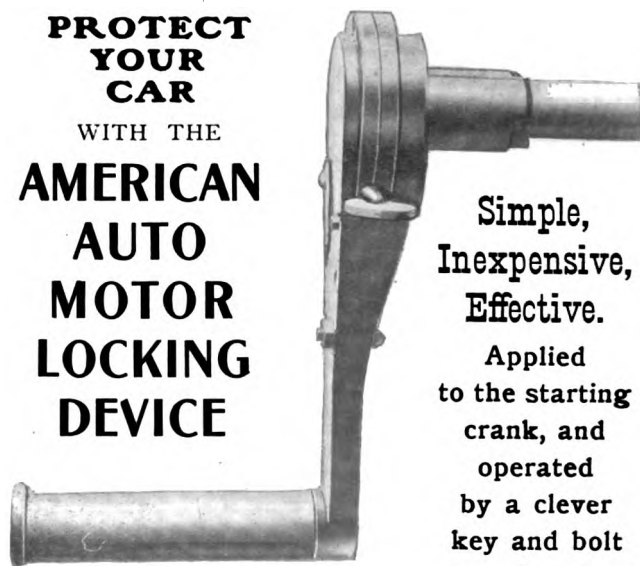
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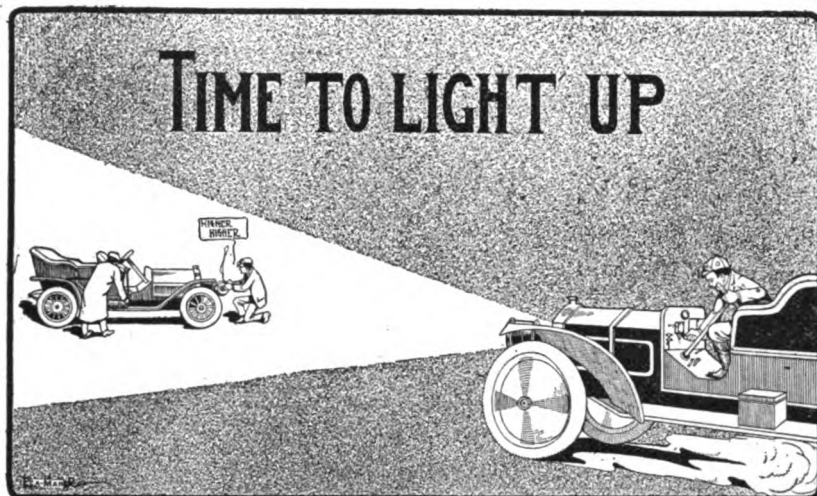
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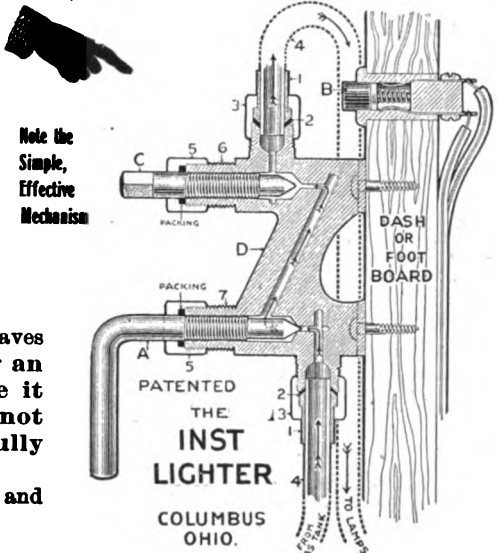
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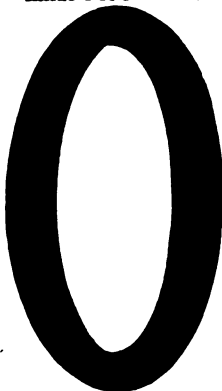
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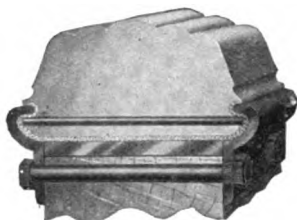
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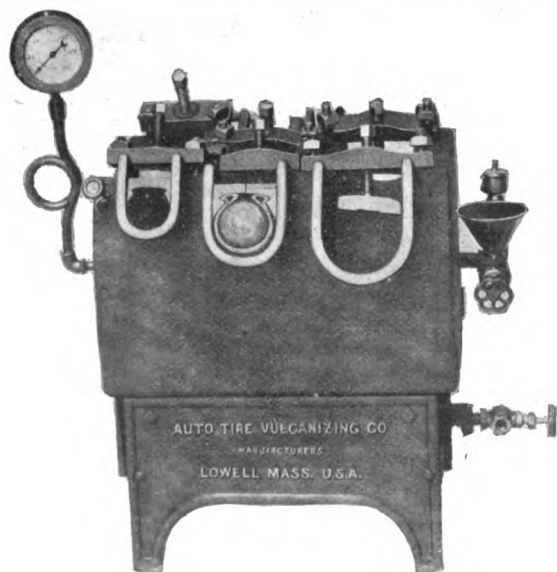
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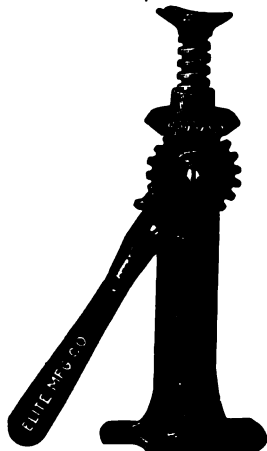
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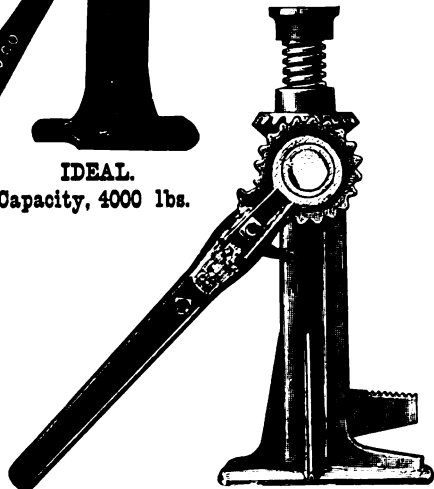
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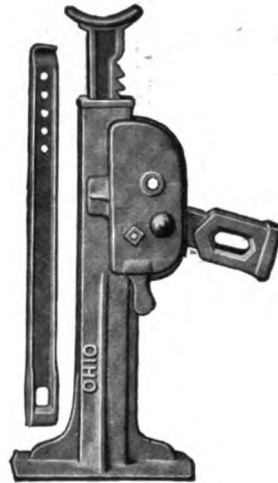
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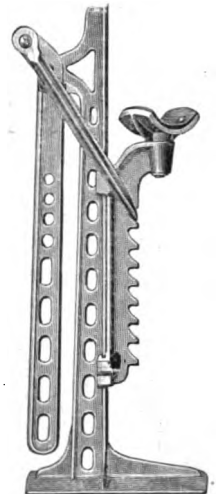
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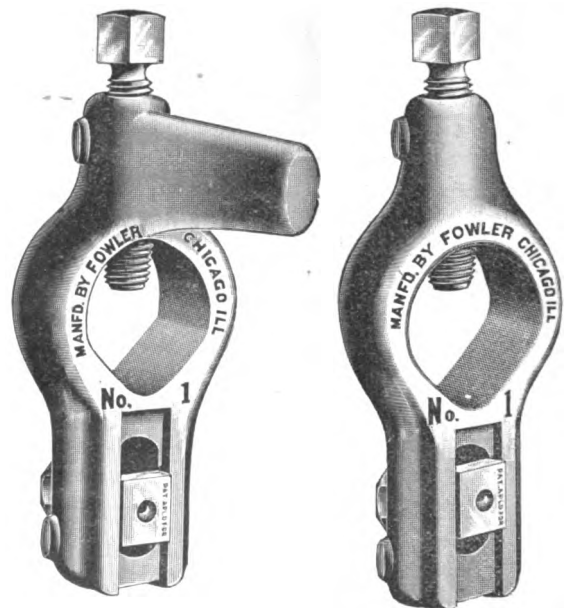
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Automobile Dealer and Repairer

A JOURNAL OF PRACTICAL MOTORING.

VOL. VIII., No. 5.

NEW YORK, JANUARY, 1910.

PRICE { 10c. PER COPY
\$1.00 PER YEAR

A ROTARY MOTOR.

Radical Departure In Internal Combustion Engine Construction.

One of the most striking features of the Grand Central Palace show, and the one that attracted more attention from mechanical engineers as well as the general public, was a new rotary two-cycle motor, which is a radical departure from conventional internal combustion principles. Something of the kind has been long looked for, and although it has not yet been tested on an automobile, it soon will be. The inventor is a bright and accomplished engineer, but he has not taken his own judgment alone; he has submitted the idea to the highest scientific mechanical authority, and the result of this has confirmed his own settled opinion that he has got something that has long been sought and that will finally be put to general use for automobiles, airships and motor boats.

Of course, the "proof of the pudding is in the eating of it," but there is any weakness or fault in the design of this motor it is not apparent. The usual types of motors have several disadvantages, despite their efficiency and practicability. One of these is complication, another, size and weight in proportion to power developed, and still another, intermittent torque, or irregular power application unless a plurality of cylinders is used, which is a departure from the simple mechanism so much to be desired. In this new motor there is simplified carburetion, lubrication and cooling; flexible flame ignition, by which the motor is entirely self-firing after the first few revolutions without the use of electrical apparatus or current; and uniform power application without complexity of mechanism.

Its compactness and power per unit weight is remarkable. It can be made small enough to drive a sewing machine, and in larger sizes can be used to run a room full of machinery. It can be fitted to the cycle frame or can be made of sufficient capacity to move the largest truck. In the newer field of aeronautics, the lightness in proportion to power, in addition to its small size, even in the larger powers, makes it suitable for use in aeroplanes and dirigible balloons, where uniform torque, simplicity, light weight, and compactness are features much to be desired.

The inventor, Oliver Light, superintendent of the R. L. Morgan Motor Truck Co.'s plant in Worcester, has been experimenting for more than five years, part of the time with the assistance of Victor Page, a well-known mechanical engineer connected with the staff of the Automobile Journal. These experiments and tests were made at first in secret, but there is now no call for that since patents have been granted in the United States and foreign countries. These motors are to be manufactured in all sizes, but it is naturally expected that their widest use will come from the automobile. The motor consists of few parts, the most important being the cylinder casting, the pistons, the outer case and the internal supply cylinder. Instead of the pistons working toward a common center or

crankshaft, as in the usual form, they work out from the central hub from which the cylinders radiate. The cylinders 8 are spaced 60 degrees apart around a central hub 6, and are cast integral with it. The outer ends of the cylinders are connected by the band of metal 51, which serves to stiffen the assembly and also to carry the fan blades 52. The cylinder unit or revolving member is mounted eccentrically or off center one and one-quarter inches from the center line of the case on large annular ball bearings 21. The interior of the hub of the cylinder casting is machined to receive a stationary internal or supply cylinder 24, which has a port 25, that communicates with the passages in the cylinder heads 22, as they revolve about it.

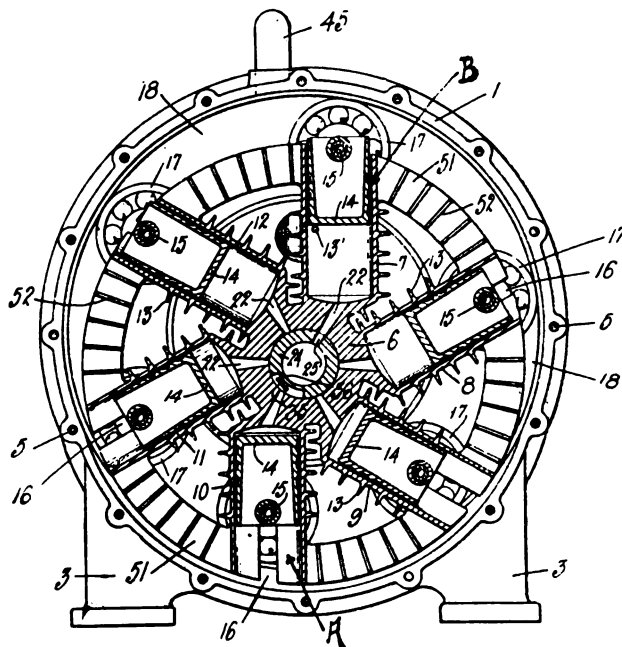


Fig. 1—Front section.

The pistons 14, carry at their outer ends suitable guideblocks which slide in the slots 16 cut in the cylinders, and these guideblocks have a hub formed integral with them which carries the annular ball bearings 17, which revolve in the track way 18, which is a concentric circle with the outer case, but which is eccentric to the cylinder casting. At the inner and outer peripheries of this track way or cam groove are mounted hardened steel tracks against which the annular ball bearings 17 bear. Obviously, as the cylinder casting revolves, the pistons not only travel with the cylinders, but reciprocate as in the more conventional types, this being determined by the eccentric groove when the engine is rotated slowly for starting, and by the explosions against the inner end of the piston and centrifugal force after the cylinders are in motion. When revolved slowly, the travel of the pistons is determined by the inner periphery of the groove, and the bearings bear against the inner steel track. Just as soon as the motor is in motion, all stress is taken by

the outer steel track and the outer bearing rings are free from contact with the inner member. A small blower consisting of the outer case 40, and the fan wheel 42, as shown at Fig. 2, is coupled to the stationary or central supply cylinder 24, and is driven from the revolving cylinder member by any suitable gearing.

The carburetor may be of the conventional pattern and its supply opening would be coupled to the blower at its mouth or intake 41, or air may be taken in and the fuel directly injected by any suitable pump. As

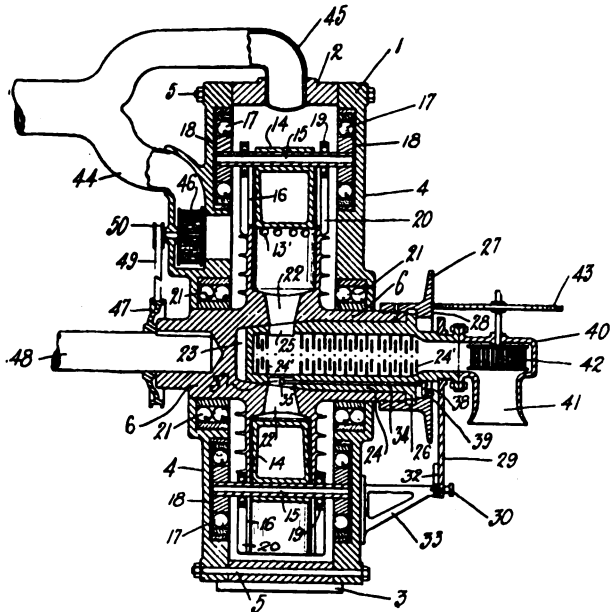


Fig. 2—End section.

the cylinders revolve, the ports in their heads register with the opening in the supply cylinder, which communicates to its interior, and as each piston is at the end of its stroke, its cylinder is filled with gas by the blower, which is afterward compressed and ignited in proper sequence.

The cylinder at the top in Fig. 2 is being charged with gas, and at the same time the inert products or residue of the preceding explosion are being discharged through the exhaust ports about midway of the cylinder, just as in the conventional two-stroke cycle motor, which have been uncovered by the piston reaching the end of its power stroke. The lower or opposite cylinder has compressed its gas charge, and the port 22 is communicating with the recess in the stationary supply cylinder which houses the igniting spark plug, either of the high or low tension type, and as the spark takes place, this being timed by any suitable cam or commutator, the resulting explosion serves to drive the piston outward and turn the cylinder casting about its longitudinal axis. As will be evident, but one main supply port is used for all cylinders, and a single spark plug serves to ignite the compressed charges in sequence.

If reference is made to Fig. 1 it will be evident that as the center line of cylinder A is offset from the point of support of the revolving cylinder member; that the explosion force which is in a straight line against the top of the piston, will force it outward and the bearings it carries against the outer periphery of the cam groove; that the effect will be the same as though the conventional crank was used, as the pressure against the outer casing will cause the cylinders to turn about their axis, the available leverage being the distance between the cylinder center line and the vertical center

line of the point of support, which in this case is one and one-quarter inches; that a leverage equal to that of a conventional engine having a two and one-half inches stroke is obtained, and that as the cylinder is offset, the effect is much more useful than is possible when the maximum explosive effort is directed against a dead center. This is the case when the piston in the usual crankshaft equipped engine is at upper top center, or end of its compression stroke. As is true of other two-cycle engines, the charging and exhausting take place almost simultaneously, the exhaust ports opening just a little ahead of the inlet port. The 360 degrees of the cylinder travel is divided into three periods, 120 degrees being covered in compressing, the charge, 130 degrees, are covered while explosion and resulting expansion are in progress, and the exhaust ports are open 110 degrees. In the usual form of two-cycle motor the intake and exhaust ports are rarely open more than 90 degrees crank travel, or one-fourth a revolution of the shaft. When one considers that the charging and clearing of the cylinder of rotary type is materially assisted by centrifugal force, which tends to throw out the exploded gas, and draw in the fresh charge to replace it, in addition to the longer port opening, it will be evident that this form should be more efficient. The charges are always flowing in one direction and the incoming fresh charge pushes out the spent gas ahead of it.

The reason why this method of construction conduces to a very light and steady running motor, is that the cylinder members act as the flywheel, and not an ounce of weight need be added for balance as the revolving mass is a useful member which generates power as well as storing energy, and forms the greater part of the weight of the motor, despite the fact that it is not much heavier than the usual fly-wheel needed with conventional motors of the same power. Another advantage of the revolving cylinder motor is that positive cooling is possible without an ounce of auxiliary

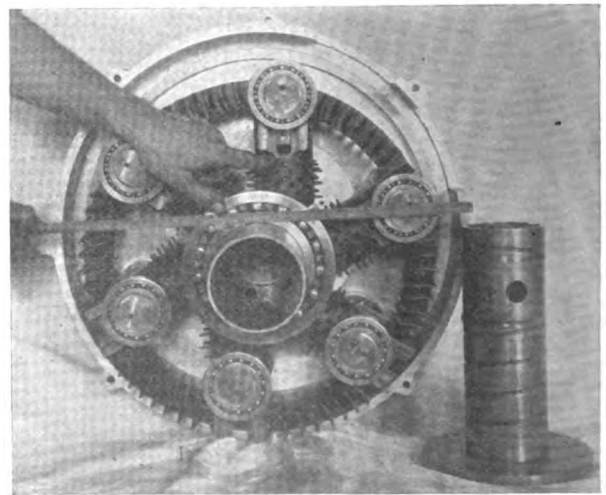


Fig. 3—Front half of case removed, showing cylinder and piston assembly, inlet and exhaust ports.

apparatus being required. The cylinders move rapidly through the case, and act as do the arms of a large centrifugal blower and the centrifugal force removes the heated air from contact with the cylinders, its place being taken by cool air inspired through the bearings, or may be supplied at atmospheric pressure when the motor is not encased. An important feature is that the circulation of air is equally rapid on all sides of all cylinders, and as these are of uniform thickness at the point where they are exposed to the action of

the heated gases, the expansion and contraction are equal and the cylinders may be made light without danger of distortion by heating.

The blower used to charge the cylinders is the smallest model produced by the American Blower Company, and is known as the Sirocco O. O. this having a "squirrel cage" fan member but three inches in diameter, and with its aluminum case and driving gears weighs but one pound. At 3000 turns per minute, it will deliver 80 cubic feet of air or vapor, and as the engine requires but 20 cubic feet of air when revolving at 1500 turns per minute, it will be evident that there is excess of requirements. This requires some power to drive it, but as but one-eighth horsepower is needed to supply the full capacity of air, it will be apparent that this factor is of little moment. The average centrifugal water pump requires one and one-quarter



Fig. 4—Showing compactness of the engine.

horsepower to drive it to full capacity while the ordinary fan, as used in connection with the motor car cooling systems, absorbs about three-quarters horsepower.

The oiling of the motor is very simple. Oil is fed in with the mixture or forced by a small plunger pump. Centrifugal force distributes it to every part and the excess is collected and trapped in the case and is drained to a sump at the bottom of the case where it is filtered and used continuously.

A double ignition system is provided, and the motor may be either self-firing or the charge may be ignited by the usual electric spark. But a single spark plug, a single unit coil, a six point timer incorporated on the revolving hub, and a set of batteries are necessary, the ignition system being no more complicated than that used on the simplest single cylinder engine.

If a magneto is fitted a single cylinder form will prove sufficient.

The strongest feature that presents itself on the entire motor, the inventor holds, is that a self-contained ignition system is possible, by which the flaming charge in one cylinder that has been fired may be used to explode gas in the next one under compression. This is accomplished by a small passage in the stationary supply cylinder, which has a bore of about one-eighth inch, connecting one cylinder to its neighbor. When the cylinder in which the charge has been exploded has passed a certain distance, the edge of the spark plug opening just registers with the edge of the port in that cylinder head, leaving an opening through which a small portion of the flaming charge reaches the interior of the next member, at proper firing point through the small opening which is registered with the opening intake port.

Both the electric and hot flame methods may be timed with accuracy, as well as regulating the admission of the charge to the cylinders by simply oscillating the supply cylinder through a small arc, this producing the effect of having the spark take place sooner or later as conditions demand, or varying the time of opening the port. The stationary supply cylinder is said to replace 168 parts used on the conventional six-cylinder four-cycle engines.

The engine is perfectly balanced mechanically, and as there are six explosions to every revolution the torque is constant, the explosions occurring 60 degrees apart. The use of a heavy revolving member, and the efficient methods of cooling enable the designers to use high compression of the charge (about 95 pounds per sq. inch) which, combined with a direct fuel injection system, would make it possible to burn any hydrocarbon, and it is said that kerosene, alcohol, benzol and even crude oil can be employed.

Fig. 4 shows the inventor holding up the 30 horsepower motor with ease, and from this comparisons can be made and proportions determined. The form illustrated weighs but six pounds per horsepower complete, though as shown the supply cylinder and blower are not fitted. The average four-cycle four-cylinder engine of 30 horsepower weighs complete about 500 pounds, or about 16 pounds to the horsepower.

The company controlling the patents is the Land, Air and Water Motors Company, a temporary organization, having headquarters at Providence, R. I., where most of the development work has been done. The perfected motor will soon be given extended trials and its efficiency determined by severe practical tests.

Carrying Spare Tubes.

A good way to carry spare inner tubes is in a box about the width of and half as long as the deflated tube, so that by folding once it will just fit. It can be made deep enough so that there will be ample room for two or three tubes. If there is not room enough in the tool chest, this box can be made of better material, finished, painted the desired color and fastened in some convenient place on the car. If fastened on the step the box should be made the width of the step and of sufficient depth only to hold as many tubes as it is desired to carry.

In packing the tube, deflate it, fold it over with a generous amount of talcum powder, then wrap in a clean dry piece of cotton flannel or ordinary cheesecloth. Each tube should be wrapped separately and packed in the box. It is well to remove them occasionally and repack so that the folds do not come in the same place as before.

Automobile Dealer and Repairer

A Magazine of condensed and compact information for busy readers.

OFFICIAL ORGAN OF THE NATIONAL RETAIL AUTOMOBILE DEALERS' ASSOCIATION

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ADVERTISING RATES MADE KNOWN ON APPLICATION

NEW YORK, JANUARY, 1910.

Missing Numbers—Our readers are requested to remember that it always gives us pleasure to re-send numbers which have gone astray in the mails.

The Automobile Dealer and Repairer in Australia and New Zealand.

Mr. R. Hill, Matlock House, Devonport, Auckland, New Zealand, is our accredited representative in Australia and New Zealand for obtaining new subscriptions.

COST OF PRODUCTION.

We do not share with others the view that cars are to be higher in price. Possibly the raw material may cost more, and there is a chance that labor may demand still higher wages in view of the additional cost of living. But as an offset to this, improvements are all the time being made in greater economy of construction and assembling. Quite likely the labor cost of manufacturing cars to-day is not one-quarter what it was five years ago, although the finished product is far better not only in the sense of utility and durability, but in the matter of general appearance.

On the other hand, those who imagine they can in some way find a royal road that will give them a car for \$500 or \$600 that is as satisfactory and durable as one costing twice that sum, will be disappointed. A Chicago mail-order house is offering an "efficient, fully equipped car" for \$395. Quite likely a good many will be sold, but in every case the purchaser will find that he has received not more than \$395 worth of car value, and less real value in proportion than if he paid twice that sum and purchased from the agent in his own locality.

An automobile is different from any other vehicle ever devised, with the possible exception of the bicycle, in that it is obliged to carry its own propelling force. Suppose an ordinary carriage were obliged to carry the horse that draws it and at the same time were speeded four times faster than any horse drawn carriage has ever been called upon to go, what would such a vehicle be likely to cost and how much stronger would it be necessary to make it than it is at present being made? And yet this is the kind of construction called for in an automobile.

But the element that figures most prominently in reducing the cost of an automobile is the labor-saving machine, which in some cases is automatic; and not only the machine, but the machine that makes the machine, for machine made machines are the order of the day. The

cost of the machine is thus marvellously low and its work is as marvellously proficient and precise, more accurate indeed than ordinary hand work. At the early stage of L-cycle making a certain make of wheel was sold for \$150 and finally the manufacturer suspended work even at that price. Soon after he began the manufacture of a bicycle that he sold for \$15, and in a conversation with the writer he stated that he could make a profit at that price, although the \$15 wheel was as good as the \$150 one that he could not make at a profit. Asking for an explanation, he stated that the high priced wheel was made by hand and the low-priced one by machine.

It is true that the higher price of the raw material that goes into an automobile will add somewhat to its cost, but this is a mere bagatelle compared to the labor cost, which as stated, is being constantly reduced by the machine. Taking these facts into consideration, we see no reason why the price of cars should be raised, unless competition be finally eliminated, which would, of course, result in higher prices.

PERSONAL TO OUR READERS.

It goes without saying that publishers deserve no more consideration from the United States Government than plumbers or preachers, or butchers or bakers. This is not a government for a class nor of a class.

But the business in which publishers are engaged deserves the utmost consideration from the government. With the single exception of our school system, periodical literature concerns the public welfare more than any government service or utility.

Yet its publication and dissemination are threatened with a deadly blow from the government and its very existence jeopardized. And for what?

Why, there is a deficit in the post office department. It does not matter that other government departments are nothing but deficit.

It does not matter that there is no single public utility that begins to approach the post office department in influence, in extent or in effect; none that can compare with it as a social, a civilizing and a business agency. Impair it, and public apprehension and protest are immediately excited, and rightly so. No other departments of the government so environs the home and the place of business.

Whether this most important of all government utilities is run at a loss of a few thousand dollars a year or at a profit is farcical and paltry. The only questions to consider are, is it honestly and economically run and does it give the best service possible?

Our public school service is run at a loss and at a total loss in dollars, but would any sane person object to it or try to make it pay? And for that matter, is there a single public utility that pays in dollars and cents? Are they not in most cases almost entirely outgo and little income?

And yet the serious suggestion has been made to increase the rates on second class mail matter—in an educational sense the most important department of the postal service—under the plea that it costs more than the government gets out of it. But suppose it does—which we will not for an instant admit? The free rural mail delivery costs far more than it comes to, and it will cost still more in proportion to the results if the second-class rates are increased, yet who objects, provided the public welfare is raised?

It seems to be considered of no consequence that this step would increase to the people the cost of their periodicals a hundred times more annually than they would save in the reduced cost of the service to the government, and it has been forgotten that the people pay all the bills, even though they come to them in different forms.

It seems to be considered of no consequence that the

proposed step would deprive them of many of the publications that they cherish most highly and perhaps have no effect on others which they regard with most indifference.

It does not so much matter that the proposed parsimonious step is a saving at the spigot and a flagrant waste at the bung hole; the government must make this single fragment of public service pay, no matter whether anything else pays or not.

As stated, publishers deserve no more consideration than plumbers, although the government has no right to take away from a publisher or from any one else that which he has acquired and owns honestly. Yet this measure would in scores of cases compel the suspension of some of the most meritorious smaller publications and injure some of the larger and more powerful the least.

But let that pass; we are talking in the interest of the public and not of the publishers.

As might be expected, the "powers that be" have kindly provided a remedy, so far as the publishers are concerned, although they have been unable to suggest one for the people. They say, "raise the price of your publication, or, or—reduce the quality." Now that would be easy if it were possible, and sensible if it were sane. But it is neither sane nor possible.

The business of publishing periodicals is to-day the most precarious and delicate that exists. The average returns for the capital, the effort and the talent invested are the least of any business that exists. The establishing of a national periodical is beset with more difficulties than ever before. With the postal restrictions with which publishers are surrounded—restrictions that are a decree, a dictation by officials, and not a law—the process of establishing a publication has become impossible without very large capital.

If this proposed increase of rates of second-class matter be carried out, it will result in a monopoly by a few publications, the death of many, and the absolute impossibility of any one ever starting a new one with any prospect of success.

We can, of course, show how the impairment and abridging of periodical literature by raising the postal rates will make a still further deficit in the postal revenues, by the loss in first-class and so-called "paying" mail which it largely creates. But that is another subject.

What we want now is for every reader of this magazine to write his member of Congress or Senator and protest against the raising of the rates on second-class mail. Tell him it is against your welfare, the welfare of your home, and the public welfare.

And please do it at once; this day or this week. Whatever it may mean to us is of no consequence. It means much to you and most vitally concerns the public. So do not delay. Send a postal card or anything else. A month later may be too late.

The suggestion of this increase in postal rates was born of a hasty consideration and is fostered by prejudice or lack of information. It ought to die as soon as possible and before it has a chance to do irreparable harm.

SIZE OF WHEELS.

A good deal is being said about the reduced wear of large tires and the advantage of large wheels. With no disposition to minimize these claims it must be remembered that large tires cost more than small tires, and that large wheels likewise cost more than small ones. Moreover, it should not be forgotten that there is a limit of superiority, both to the size of tires and the size of wheels. Wheels that are too large are as bad as wheels that are too small. Of course, tires of small size strike the ground oftener in going a given

distance than large tires, and it must be admitted also that they are more liable to heat and to severe strains. On the other hand, a large tire must be built very much stronger than a smaller one, and this applies also to a large wheel. This matter is referred to merely to show that there are two sides to this question.

Years ago it was thought that the old-fashioned high wheeled bicycle of the original pattern would run easier than that which was brought out later and was called the "safety" bicycle. Those who were wheelmen in those days, however, soon found out this was not the case. Small wheels ran easier, and possibly one cause of this was owing to the fact that they could be made very much lighter. There is no doubt a happy medium in the size of wheels and tires. Quite likely it has been nearly reached in the cars of 1910, which have enlarged their wheels to from 36 to 40 inches.

THE MACHINE MADE CAR.

The representative of the foreign manufacturers in this country naturally stands for the foreign product, but he does not defend logically the car made abroad. He says:

"Buyers know by education that cars turned out by the thousand, as is the custom of American manufacturers, lack the finish and workmanship of imported cars made in small quantities of each type, with most of the parts adjusted by hand to fit exactly. It is cheaper to make cars of only one type and build thousands of them, getting the parts from stock and assembling them, but they lack the delicate precision of minute adjustment."

He is wrong here. The machine made part to-day is more precise than that made by hand. In fact, the less hand work on the car the better. This is the age of machinery, and the more general it is used the more satisfactory will be the product. It is true that the machine may overlook defects in material, but it fashions the material far more accurately than it can possibly be done by hand.

NEW AUTOMOBILE LAWS.

Although the new automobile law which has just gone into effect in Massachusetts is not ideal, some of its features are in the right direction and are along the lines advocated in this magazine long ago. They will be followed by similar laws in other States. The most important provision is the punishment of \$200 fine and six months in jail for driving on the highway so as to endanger others no matter what the speed may be, and the same punishment is to be meted out when anyone attempts to escape after injuring a person. Another provision is a jail sentence of from one to two years for anyone twice detected running an automobile while under the influence of liquor. Still another clause forbids a person under 18 years of age from running a car. As to the age limit, we believe this is a mistake. The automobile will soon become the universal means of travel, quite likely displacing to a large extent even the use of the steam railways. With this prospect in view it is not a good plan to prohibit anyone from driving a car. There are many young men under 18 years of age who are as well able to drive a car as others three times that age, for we have stated before, safety is not a matter of age or knowledge so much as it is a matter of care and self-control.

We are inclined to think likewise that the liquor clause is unwise. Of course, no one has any business to drive a car, or a horse for that matter, when intoxicated, but a provision of this kind would be extremely difficult to en-

force, and we believe that the matter could be better regulated by letting any one drive a car who wants to do so, and fixing the necessary severe penalty in case of recklessness and public injury.

One of the most important elements of all laws is simplicity and ease of enforcement. It need hardly be stated that we relinquish to no one a due regard to temperance and even total abstinence, but just how an official can easily determine whether a man is under the influence of liquor or not is a question of a good deal of uncertainty. By the same process of reasoning it might be a good plan to make a law compelling everyone to keep their doors and windows locked and have burglar alarms as a preventive of theft, but it would be a difficult law to enforce and likewise an unwise one. The less laws we have and the simpler they can be made the better.

THE PASSING OF COMPETITION.

The most striking and momentous movement that the economic world has witnessed for centuries is the passing of competition.

In the beginning this process was slow. The time-honored axiom, "competition is the life of trade," had been generally accepted and considered essential to the public welfare, having been imbibed by the fathers and breathed into the ears of the sons. To throw it off like a worn out garment seemed like denying one of the foundation stones of political economy.

But all unmindful of discussion and tradition, and unconcerned by theories and abstractions, the mute forces of economic evolution continued, gaining momentum as they went on and co-operation soon began to be seen everywhere. The individual capitalist either from compulsion or choice is now yielding his place in the industrial world to the corporation and trust, while they in turn combine and consolidate the independent managements or numerous concerns under one corporate direction.

While there is still individual competition, especially in the retail trade, its death knell has been sounded. The old axiom, "Competition is the life of trade," has given place to the new one, "Co-operation is the life of trade."

It is not the purpose of this magazine to oppose the movement nor to favor it. One does not waste time in opposing the changing seasons. He accepts them as they come, knowing they are simply a part of the laws of nature, and governs himself accordingly. Moreover, this tendency toward combination is becoming something like the car of Juggernaut. Those who oppose it are likely to be over-riden, flattened out—ruined.

The world moves forward, not backward. Rightly safeguarded or controlled the great corporation or trust is a public benefit. It inaugurates and admits of economies in production and distribution, and has a tendency to a solution of the labor problem.

The subject is too vast and has too many ramifications to fully cover within the limits of space of an editorial, but business men will do well to consider it carefully, and with full confidence of its permanence and final universality.

WILL YOU HELP US?

We want to add 5,000 new subscribers to our list during the next three months. If each present subscriber were willing to recommend the AUTOMOBILE DEALER AND REPAIRER to just one friend who would send his subscription, our desire would be accomplished three times over.

If you believe our paper has been helpful to you, we would like very much to have you tell others about it. Perhaps you will be conferring a favor on

them as well as upon us by so doing. Let us work together for an increased circulation.

The greater the income the greater our capacity for improving the paper, and every improvement is of advantage, of course, to every present subscriber.

LESSONS FOR DRIVERS.

Carelessness and Ignorance Responsible for Most Accidents.

Without doubt the feeling against reckless driving is stronger than ever before, but when it comes to measures to stop it nothing has yet been devised that can be depended upon. Speed regulations and the necessity for a more stringent observance of the rules of the road formed one of the most important topics of discussion at the annual meeting of the American Automobile Association held in New York recently. The following resolution was adopted:

"Resolved, That the American Automobile Association places itself upon record as being unalterably opposed to the unfair use of the highways by criminal and lawless operators of motor driven vehicles, and furthermore this national organization of automobile owners calls upon its various state associations to propose and secure the passage of laws which shall rid the highways of reckless and inconsiderate drivers even to the extent of revocation of licenses and jail penalties in proportion to the nature of offences."

This shows the right feeling, but as is now becoming pretty generally known, the difficulty is not so much in punishing the offender as it is in apprehending or identifying him. It is true that the license number answers the purpose under favorable circumstances, but in the case of a decent man a license number is unnecessary for the purpose of identification and in the case of a vicious and reckless rascal it is not sure or sufficient. In the case of darkness, of the knocking a pedestrian down or running into a light horse drawn vehicle, or of clouds of dust it is seldom one is able to get the number of a car if there is any disposition on the part of the driver to prevent it. Below will be found some of the accidents of the month that are most instructive and useful to others:

Skull Crushed Against a Tree.—In Burlington, N. J., a man was killed on the outskirts when with his automobile speeding at sixty miles an hour, hit a tree, and the five occupants of the car were hurled into the air, while the machine itself was reduced to a heap of wreckage. The entire party was more or less injured and none of the survivors can give a clear account of how the accident happened. One of them says that the car suddenly became unmanageable, and before they could stop it, it veered to the side of the road and hit a tree. Examination of what is left of the automobile increases the mystery as to what caused the accident, for the steering gear appeared to be in good working condition. It may be remarked, however, that a speed of sixty miles an hour, and the fact that one or two liquor saloons had been visited, may account for it as easily as anything else.

The Car Turned Turtle.—There is, of course, a good reason why a fire automobile responding to an alarm should go at high speed, but even though this be so, it is better to go a little slower, and finally land at the scene of the fire, rather than to go faster and land into Eternity. In Louisville, Ky., the chief of the fire department started with two newspaper reporters, and in attempting to swerve the machine in order to allow an express wagon to pass, the car skidded and was turned completely over. Two of the men were pinned under the car and the other was thrown over the top of the automobile for a distance of thirty feet. The groans and cries of pain from

the occupants could be heard above the sound of the engine, which was working furiously, while a stream of gasoline poured from the leaking tank. The engine was finally shut off and no further damage was done. One of the victims had his jaw broken, a large hole in his skull, his tongue split, his right arm broken and numerous cuts and bruises to other parts of his body. He will probably die. The others escaped with less serious injury, but even they may never be fully well again.

Slippery Railroad Tracks.—Near Fort Worth, Tex., a man and his little daughter attempted to cross the railroad tracks, when the car skidded and dashed with tremendous force against a telephone pole. The car itself was almost a total wreck, and although it was not going at a great speed, the rails were so wet and slippery that upon striking them longitudinally, it whirled around and struck the telephone pole with a loud crash. The man's arm was broken and he was otherwise injured, and both the occupants were pinned against the post so tight that it required the efforts of several men to extricate them.

A Fatal Crash.—In Philadelphia, a man was driving along the street at night when his car skidded into a telegraph pole. The machine was wrecked and the man himself fatally injured. The news of the death of the man was not carried to his wife who was in another part of the hospital herself suffering from injuries due to an automobile accident.

A Bursting Tire.—While a physician was driving along at a moderate pace near Lockhaven, Pa., one of the front tires of his car suddenly burst. The machine skidded to the side of the road and collided with the telephone pole, throwing the four occupants of the car out, and all were more or less injured.

Pinned Under His Car.—A Grand Rapids, Mich., physician was on his way to make a professional call, and when turning a corner the steering gear of his car broke and he lost control of it. It dashed into a telegraph pole, rebounded and turned completely over, the physician being underneath the car. Fortunately, his body lay under an open space so that the car did not press heavily on his chest. He was not able to extricate himself, however, and those who saw the accident were obliged to come to his assistance. He was not fatally injured although the automobile was badly smashed.

Result of Skidding.—In Dayton, Ohio, a woman is recovering from a good many serious injuries received in a wreck. Near a street crossing she with her husband was driving at a moderate speed, when the car skidded and struck a telegraph pole with terrific force which threw the occupants out, and they were very much cut and bruised. The car itself was also badly damaged. More accidents naturally occur from skidding in winter than in summer, but many of them might be averted if car drivers were to turn the front wheels in the direction the car skids rather than in the opposite direction. Of course, in going at slow speed not much damage is likely to occur when a car skids, but if it skids when it is going rapidly serious results are sure to follow.

Two Cars In Collision.—Near Little Rock, Ark., a touring car hit a roadster behind the front wheel. It completely wrecked the roadster while the touring car ran about 50 feet and struck the curbing. It was pretty well demolished. The front wheel and axle being crushed and the front and side of the car injured beyond repair. The driver of the touring car had been warned several times to go more slowly, and if he ever drives a car again, possibly he will heed the injunction.

Hurled Beneath a Trolley Car.—In Newark, N. J., a negro, the sole occupant of an automobile, ran into a man, and he was tossed under an approaching trolley car and instantly killed. The driver of the automobile put

on speed and disappeared before the number of his car could be ascertained. He was apprehended later, however, and turned over to the police. An explanation of the cause of the accident is easy when it is stated that the car was going at about 35 miles an hour and on a street where there was much travel.

An Old Story of Carelessness.—One of the most inexcusable accidents of which drivers are guilty is running over people who are just stepping from the platform of a street car. They are inexcusable because the person alighting from a car is unable to see an approaching automobile until it is clear of the street car, and this is usually too late, especially as the victim cannot very well keep his eyes both on an approaching automobile and on the street to see where he is to put his feet. In nine cases out of ten where such accidents occur, the fault is clearly on the side of the automobile driver. In passing a street car, he should not only assume that a passenger is liable to alight at any minute, but that in case he does alight he will not be prepared to avoid the automobile. In Pittsburg, Pa., an automobile was being driven past a street car that had stopped to unload some passengers, when two children got off directly in front. A little girl was run over and killed and a boy maimed for life.

A Bit of Good Luck.—In Binghamton, N. Y., when there was a heavy fall of snow a man took the grade leading to a viaduct on high speed, when the front wheels hit the iron railing two of the four-inch iron posts broke off near their base, and the top rail snapped as if it were wood. The two sections swung out into space like a double gate and the front wheels dropped off the sidewalk as the rear end of the machine skidded around. It is thought that the hub of a rear wheel caught in the solid railing and thus held the machine for a moment checking its speed just enough to keep it from plunging to the roadway 30 or more feet below. A team of horses was secured and the machine was pulled back. If the hub had not caught the man and car would have fallen to certain destruction and instant death.

Automobiles in Europe.

In England and Wales, according to statistics just issued, 89,853 automobiles are registered, while France, which in the early days of the car greatly exceeded England in the number it possessed, has only 37,500 automobiles and motorcycles. Germany has but 18,000 registered. There is no information regarding Russia, but of the smaller countries, if this be a test of wealth, Holland is infinitely the richest, for it has 10,800, while Switzerland has only 5,500. Then to the number of automobiles in England and Wales ought to be added 7,521 in Scotland and 3,790 in Ireland, so that the United Kingdom altogether possesses more than one hundred and one thousand cars. Italy is said to have but 5,500 cars.

The Buick Plant.

For an automobile plant which in the beginning covered 2,000 square feet of floor space and began by employing fifty men, with a capitalization of \$75,000 and an annual output of eighteen cars, to increase its floor area to 1,890,000 square feet; its force of workmen to 5,200; its capital stock to \$2,600,000, and its annual output to 50,000 cars, with the record single day out put of 196 cars and likewise increase the population of the community in which it is located by 100 per cent. within a similar period of five years is an almost unimaginable achievement. And yet this is what the visitors to the plant found the Buick Motor Company has done. The factory is located at Flint, Mich.

THE AUTOMOBILE IN COURT.

Alleged Negligence.—A street car conductor in Connecticut sued the owner of an automobile for injuries which he sustained by reason of the operation of the defendant's car by the owner's driver. On the trial of the case the plaintiff introduced evidence to show that he was conductor on an open trolley car, and that he was on the running board of the car engaged in issuing transfers to passengers. He was suddenly struck by a part of an automobile driven in the opposite direction from that in which the street car was moving. The trolley car was well lighted and was seen by the operator of the car when he was several squares away and there was sufficient room for the driver to have passed upon either side of the car without striking. On the outside of the car was an iron hook which was used for the purpose of holding the top of the car in place. This hook struck the conductor, cut a deep gash in his leg, threw him to the ground and rendered him unconscious. The court held that under such evidence it was a question for the jury to determine whether the defendant was guilty of negligence and that there was sufficient evidence to sustain a verdict rendered for the plaintiff. The defendant claimed that the damages assessed were excessive, but the court denied this and said that the question of the amount that plaintiff should be allowed for his injuries was peculiarly within the province of the jury and would not be disturbed by the court on appeal.

Owner of a Car Responsible.—In a New York case the plaintiff recovered a verdict against the owner of an automobile and his driver. The facts showed that the driver, with the permission of the owner, was driving the machine in company with certain of his boon companions, when he ran into a doctor's gig which the plaintiff was driving. The trial court instructed the jury that the owner of an automobile was responsible for injuries caused by it by the negligence of any one whom he permitted to run it on a public street. The Supreme Court of New York in passing upon this instruction stated that the legal proposition involved was a novel one, but that it found full justification in the novelty of the situation. The court said: "An automobile being a dangerous machine, its owner should be held responsible for the manner in which it is used; and his liability should extend to its use by any one with his consent, he may not deliver it over to anyone he pleases and not be responsible for the consequences. * * * In cases where an automobile is used without the consent of its owner, the latter should not be held responsible; but, in those cases where an automobile is operated on the highway with the consent of the owner, he should be responsible."

A Legal Anomaly.—A municipal ordinance provides in substance that no vehicle "shall be used upon the streets of Columbus unless the same shall have been licensed." But the courts hold that such an ordinance could not be made to apply to non-residents of the city who merely drove through the streets of Columbus occasionally, and who used the streets only for their own pleasure or private business.

Railroad Responsibility.—In a recent Pennsylvania case, facts showed that the plaintiff was riding in an automobile, which was operated by his son-in-law. In the course of the ride, they approached the grade crossing of Barney street and the Pennsylvania R. R. Co.'s tracks in the city of Wilkes-Barre. The safety

gates at this crossing were seen to be raised and no watchman was on hand or in sight to give the motorists warning of a train's approach. Plaintiff showed that on approaching the tracks, the automobile in which he was riding was brought to a stop, or very nearly so, and that upon a signal to proceed from a trainman, the automobile was driven upon the defendant's tracks, and was then struck by coal cars which were being backed. The plaintiff further showed that he was not warned of the approach of the cars. A jury in the court below gave a verdict for \$3,500 to the plaintiff, and an appeal was taken by the railroad company. On this appeal the decision below was affirmed. Counsel for the railroad, on appeal, made the contention that the evidence showed so clearly a failure on the part of the automobile driver to observe his duty at the approach of the crossing, that the court would be justified, as a matter of law, in stating that the plaintiff could not recover, because his negligence contributed to his injury. The court refused to consider this question, and held that such evidence was properly left to the jury in the lower court, which had decided in favor of the automobile driver.

Low Powered Cars.

Foreign car manufacturers are paying a good deal of attention to low powered cars of high grade and claim they have some decided advantages. Twelve horsepower cars are built by nearly every great maker of Europe, and several put out ten horsepower machines. All of these small cars show the same soundness of construction that is characteristic of the high powered cars. They are built as touring cars, runabouts, and limousines. That the twelve to fifteen horsepower chassis are the most generally used abroad, not only by people of moderate means, but by the wealthy as well, proves that there are particularly advantageous features of utility about them.

These low powered small cars may not be suited to American roads in general, and this may be why none of the makers who stand highest in America have put forth in recent years a car for the individual motorist's use of less than approximately twenty horsepower. The scale of popular power has lowered in this country during the past two years as a result of foreign influence, but it is still double the standards of Europe.

The advantages these low powered cars have over their more powerful neighbors on this side of the water are not to be overlooked. So important are they that it is predicted that before many years pass this country will see a native output along the same lines. In economy of first cost and continued operation the small motor obviously leads. By the use of three-speed gear boxes the power under the hood may be utilized to almost as great advantage under normal conditions as double such power. The average maximum speed of these cars, governed largely by the size of the body and the number of passengers carried, is from 35 to 50 miles an hour. With the speed restrictions there are only rare opportunities to go faster than this on the level. On steep hills second and first speeds are employed to climb without rushing. The average American prefers to go up on top speed, and so calls for more power, but accidents sometimes result.

The small car uses half as much gasoline, less lubricant, and entails a tire bill much smaller than cars of the power now about standard in the United States.

Never change a single ball in a bearing. Renew them all.

THE REPAIR SHOP

MECHANICAL TROUBLES.

Some of the Most Common and How to Best Remedy Them.

So far as the maintenance and repair of a motor car is concerned the classes of trouble can be very roughly summarized into two main sections. The first is that due to the erratic behavior of the engine and its accessories; that is to say, all troubles which are connected with the behavior of explosive mixtures and the means necessary to control their working. The other division, which from a practical point of view offers considerably more variety in the nature of difficulties and the means adopted to overcome them, is trouble which is due to the improper working of the machinery of transmission, and the gear required to control the various motions of the car, after the power has once left the engine.

In order to illustrate how very interesting such problems may at times become, it is worth while discussing briefly a few of the troubles which are to be found in the gearing and transmission parts and similar portions of the motor car as it is brought into a repairing station. It is not proposed to treat these matters in any scientific or systematic way, but simply to detail one or two instances which go to show that a man who undertakes the maintenance and repair of a motor car must know a considerable amount about ordinary shop engineering, and also the special mechanical points of a car.

Take as a single example the steering gear of a motor car. In one instance it was found that the steering gear of such a car had very nearly half a turn play, and this evidently made the steering not

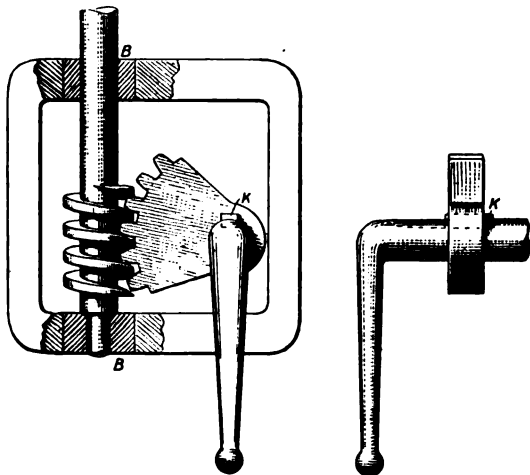


Fig. 1.

only awkward, but dangerous when the car was being taken through crowded traffic. It was therefore necessary to dismantle the steering gear, and the first point which was looked to was to discover whether there was any slacking of the wheels or the connecting rod. Afterwards the worm and quadrant were examined. The latter was found to be slightly worn, as the car had been commissioned for some considerable time, but the amount of wear was not sufficient to account for all the play that was experienced, and on removing the key K and holding the quadrant arm to the spin-

dle it was found to be very badly worn. Further play was also allowed by the fact that the bushes B in the steering gear box were worn, allowing the rack to be forced away from the quadrant, and thus it was impossible to keep the teeth fully engaged. The skeleton in Fig. 1 will show the nature of the difficulties in this instance, and in order to correct them it was necessary to fit a set of new bushes and a new key. This repair remedied the trouble.

It is sometimes found that the gears of a car are very noisy when the car is running, and if we may

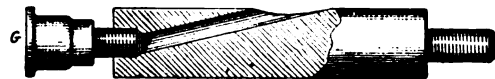


Fig. 2.

assume that the car has done a fair amount of work, this noise may be due to worn teeth and worn bearings. It is evident that if the latter are slack the gear wheels are not kept in mesh to the right depth, allowing the teeth to strike against one another continually instead of rolling together. This will partly account for the noise, and old cars suffers very badly in this respect. In order to remedy this the best method is to fit new gear wheels and bushes, but if the gears appear good enough for a few more hundred miles, a handful of sawdust and French chalk and a good thick grease, is an application which tends to deaden the noise, and does not appear to do any harm to the gears or other parts of the box. This, however, is simply a temporary expedient, designed to overcome the nuisance to the owner of the car until sufficient wear has been taken out of the gear to justify an entire renewal.

Somewhat analogous to the noise which is found in gears is a trouble which occasionally happens in the springs. In one case the owner of a car was puzzled by a mysterious squeaking on his car. Nothing, however, unusual was noticed when running the engines and when the back wheels were jacked up at the garage and the gears put in, everything was found quiet, when the engine was turned over by hand. The car was then tried on the road and the indication pointed to trouble with the springs. The load was removed from these by jacking the chassis, and when the leaves of the springs were thus to some extent separated from one another, grease was smeared in between them with a knife. In addition to this the spring shackle bolt was removed and a hole was drilled down the middle so as to emerge through the side at a distance of about half way down the bolt. At the end of the bolt where this hole commenced a grease cup was attached as shown in the sketch, Fig. 2.

When the bolt was replaced it was found that the use of grease between the leaves and the constant fresh supply secured by means of the grease cup G, effectually cured the trouble, although the leaves would have been better if they had been removed and scraped free of rust which had accumulated between them, owing to continuous running in dirty weather. This would, however, have necessitated the car being laid up while the springs were removed and this was not practicable.

A very good device which can be used to overcome

the noisy rattle which is to be found on cars which have had a certain amount of wear, is a washer used in the following manner: The hole in the washer should be an easy fit on the bolt over which it has to be slipped, so that it can easily be slid into position where the play has to be taken up. The washer should then be slightly curved and then hardened in prussiate of potash. It will be found that washers made in this way will maintain a permanent spring, which will effectually stop all play and rattle, and will last a very considerable time. A typical arrangement of such a washer is shown in Fig. 3.

One instance of a very curious knock which occurred on a small car may be instanced as showing that the

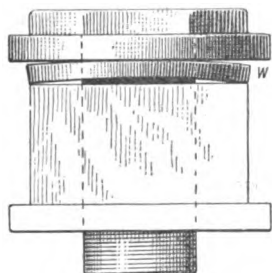


Fig. 3.

repairing mechanic has to have his wits about him in order to locate unusual causes of trouble. This knock sounded while the engine was running exactly like the click of a worn big end brass, and at first these were suspected. The big ends and gudgeon pins were however quite tight and there was not sufficient play found in any bearing to account for the knock. It was then thought that the trouble might be due either to free ignition of the explosive mixture causing a back pressure on the piston; a wrong timing of the sparking or too rich a mixture, but these points were found to be quite in order. Moreover the knock was present when the car was running on the level as much as when it was climbing a hill. It was then decided to examine the clutch carefully, and when this was done it was found that one of the bolts that held the clutch to the gear shaft was hitting the clutch fork at each revolution, and this caused the knock. The sketch in

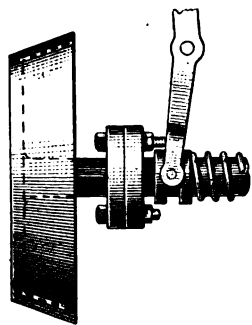


Fig. 4.

Fig. 4 will explain the very simple cause of all the trouble.

Gears, as every motor mechanic knows, are a very fruitful source of trouble, and an instance of this occurred on a car fitted with direct drive. On its third speed the gears refused to stop in mesh and the change speed lever could not be pushed right home in the notch to take the third speed. In order to discover the causes of the trouble the lid of the gear box was removed, but everything appeared to be tight as regards the gear and there was no obstacle in the box to cause the trouble. The top half of the gear box was then entirely removed and it was then seen that the selector rod had been bent at some time, probably owing to careless changing of the gears, as will be seen in

Fig. 5. The dog drive would be firmly together before the change speed lever was able to drop into the slot provided for it in order to prevent the gears being forced out again. Moreover, when the lever was right home on the second speed notch, the second speed gear wheels could not fall in mesh. The trouble was of course very simply removed by taking off the bent selector rod and fitting the car with a stouter rod.

Another most common cause of trouble in connection with gearing is the fact that the oil which is used for lubricating the gears persists in running out of the gear boxes and end bearings, and if this is not detected in time and allowed for by adding fresh oil, considerable wear and trouble is likely to ensue in connection with the gears. This nuisance can sometimes be cured by cutting a spiral groove in the bearing, care being taken of course to cut the spiral in such a direction that the oil is drawn back and not urged forward by the rotation of the shaft, as it runs in the bearing while the car is running forward. This spiral really acts as a sort of Archimedean screw, lifting the oil back again from the outer end of the bearing to its proper place in the receptacle.

Dealing now with the wheels themselves, which may be regarded as the last link in the chain of power transmitting devices on a car, trouble is frequently

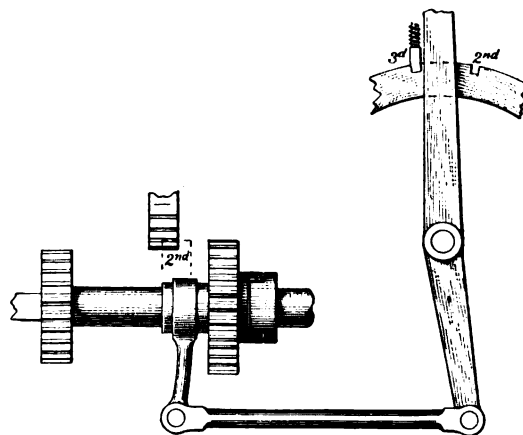


Fig. 5.

experienced because of worn collets. If the front wheels of a car show a great tendency to wobble while a car is running on the road, the front axle should be jacked up at the first opportunity and the spokes of the wheel should be grasped firmly, the wheel being pushed backward and forward along the axle. If any play is found in this manner it will probably be due to the fact that the brass collet has become worn. If this is discovered to be the case, the hub cap should be removed and the split pin or lock nut removed from the axle nut. The latter should then be screwed up a turn or two in order to take up the slack; the nut should be so adjusted that there is no play and yet care must be taken to allow the wheel to run perfectly free. This can be discovered by noting whether the wheel will swing by the weight of the valve on its rim. When this is discovered the lock nut or split pin should be replaced and the hub cap filled with grease and screwed tightly on.

It is also necessary in such a case to test the front wheels in order to discover whether they are truly parallel with each other. In order to do this, the distance between A and B in Fig. 6 should be measured with a long strip of wood. Then the wood should be placed behind the wheels at C and D and the distance tried again. Should the distance A-B and C-D be unequal, the connecting bar should be shortened until the wheels are truly parallel. Some makes of cars are

fitted with adjustable bars for this purpose, and unless the wheels are true, a very considerable strain is put upon the tires, resulting in their very rapid wear.

A final word may be given as to what to do should one of the driving chains of a car break while it is out on the road. It is possible to get along by careful driving, at any rate, for a distance sufficient to get to a garage or to secure assistance, by tying up the sprocket, preferably by wrapping up the broken chain round it and lashing up firmly with rope. It must be remembered that the height of the gear is exactly double the value it had before the accident when driving

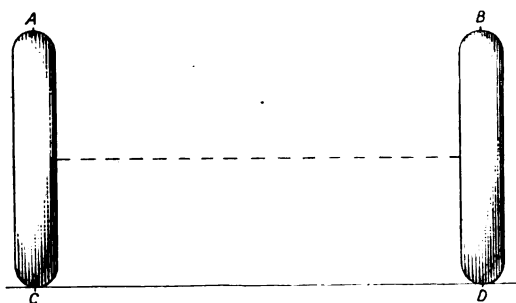


Fig. 6.

with two chains, owing to the fact that the differential comes into play.

The above notes are only a few samples of the large number of practical hints which are necessary for the practical mechanical engineer to know in order to be thoroughly competent to deal with the classes of transmission gear accidents which occasionally arise. They are, however, given in order to demonstrate the way in which such problems should be tackled and the need for a certain amount of ingenuity and originality in order to cope successfully with the troubles of a motor car.

Benefits of a Big Spark.

It can be easily shown that a fat spark is better than a lean one. A fat spark is heavier and in effect hotter than a lean one. It starts the fire more quickly because it in itself comes in contact with more of the mixture. The rate of flame propagation is consequently increased. The inflammable mixture burns more rapidly. Of course, if the mixture burns rapidly, the impulse delivered to the piston will be greater than if it burned slowly. The pressure is in proportion to the rapidity of the expansion of the gas, caused by the heat generated in the burning. The more nearly this burning approximates an explosion in point of time, the greater the impulse delivered to the piston. This must be true, because the piston is moving with great speed, and if the burning is slow, it will have time to move away from the power impulse, so to speak. In a properly proportioned mixture the difference in results may be negligible, but such a mixture is extremely rare. Every variation in cylinder or external temperature, air pressure, atmospheric humidity, quality and density of fuel, engine speed, etc., affects the quality of the mixture.

Cleaning With Soap.

To prevent damage to varnished surfaces, soap should be dissolved in water before using. Dissolve one pound of high-grade soft oil soap to each gallon of water, and use from half to a full pint of this solution to each pail of wash water. Do not put raw soap into the pail which is used for washing the car. Wet the car first with clean water, then wash with the suds and immediately rinse with hose or sponge.

Starting a Kicking Engine.

When attempting to start an engine fitted with magneto ignition of which the firing point is fixed there is always danger of a back-fire happening and damaging the operator's arm. The reason is that when no arrangement is fitted for varying the time of ignition the magneto armature is set so that the spark takes place early—in fact, slightly forward of the end of the compression stroke. Consequently if the starting handle be cranked slowly a back-fire is obtained. This advanced position is necessary to enable the engine to run at high speeds. To safely start such an engine the course to adopt is as follows: Put the switch to the "off" position, then swing the engine crankshaft round smartly for a few revolutions after the throttle has been opened and the carburetor float tickled. Then put the switch to the "on" position, and pull the starting handle up smartly over the firing center by means of a looped cleaning cloth. It will be found that a very smart pull over can be obtained by this method, and if a back-fire be accidentally obtained the cloth is snatched out of the hand without damage to the operator.

Changing Detachable Wheels.

Clumsy work is often made of changing a detachable wheel. Here is what was seen the other day:

A small, narrow-based jack had been screwed up under a portion of the front frame, and the wheel with the punctured tire had been removed. The side brakes were not applied, nor were any of the wheels scotched, and the spare wheel was left on its brackets until the other wheel was removed from the axle. In taking the spare wheel off its brackets, the car was inadvertently jogged a trifle, and immediately it slid off the jack, and one end of the front axle came down bang on the road. It was a very awkward job to get the axle lifted again, and when it was safely on the jack once more, it was found to be so bent that the wheel could not be fitted. It follows that when a detachable wheel is to be changed, the brakes should be applied, and the car stopped on a level patch of road free from excessive camber. The wheels should then be scotched, and the spare wheel laid ready to hand before the other wheel is detached.

Starting on Low Tension Magneto Ignition.

Although the low-tension magneto system is gradually being superseded by the high-tension magneto, there are still a great number of the low-tension magneto ignited engines in use, and cars are still being turned out fitted with this system. In some types of vehicles starting the engine appears to be a difficult operation unless the crankshaft can be swung over very smartly through a large number of revolutions. When the compression is good and the cylinder bore large this is an exhausting operation. To get an easy start it is not necessary to swing over the engine quickly except for the reason that speed is necessary for the magneto to give sufficient current to produce an effective spark when the mechanical break of the ignition tweaker takes place in the cylinder. If this spark could be produced without turning the engine over quickly little exertion would be necessary to start the engine. To get this effect all that is necessary is to provide an eight-volt battery and use it in conjunction with what is known as an intensifying coil. The accumulator coil and low-tension circuit of the ignition tappet system need only be then connected in series, and it will be found that if the engine be first cranked over smartly without the accumulator switch being on, and then the switch put on and a slow pull over given to the engine starting handle, an easy start will be effected. When pulling over slowly with the accumulator in circuit care must be taken to see that the ignition is first fully retarded.

THE COOLING CIRCUIT.

Action of Scale In Resisting Heat and Other Important Facts.

II.

BY SYDNEY F. WALKER.

Continuing the previous article, it may be interesting to give a few calculations. Every gallon of gasoline that is usefully burned, should liberate approximately 140,000 B.Th. units. This figure is arrived at in the following manner: The specific gravity of the gasoline that is used for motor engines ranges from .66 to .7. A gallon of water weighs 10 lbs., and therefore a gallon of gasoline of a specific gravity of 0.7 would weigh 7 lbs. Each pound of gasoline, when fully consumed, in the process of combustion, should liberate 20,000 B.Th. units, and therefore a gallon of gasoline of specific gravity 0.7 should liberate 140,000 B.Th. units. This is on the supposition however, that the whole of the gasoline is burned. That is to say, supposing a motor car uses a gallon of gasoline in running over a certain distance, if the whole of the gasoline had been properly burned, the above number of heat units should have been liberated.

Unfortunately this is very rarely accomplished. The whole of the gasoline is very rarely consumed. Some of it is nearly always driven out with the products of combustion, through the exhaust, so that if we estimate that 120,000 B.Th. units are liberated, for every gallon of gasoline the engine apparently consumes, we shall probably be fairly liberal. Of this amount of heat, 30 per cent. is usually carried off by the cooling water. In this case 36,000 B.Th. units would have to be carried off and delivered through the radiator to the atmosphere. If we assume that the gallon of gasoline was used in an hour, this means that 600 B.Th. units per minute have to be carried off by the cooling water, from the engine cylinder, and delivered by it, through the walls of the radiator tubes to the

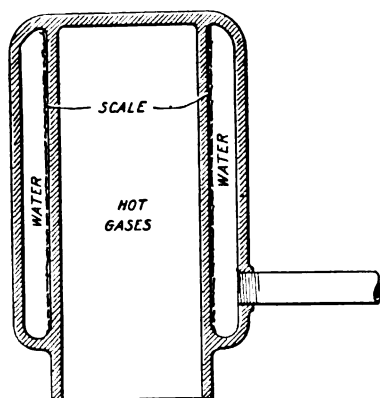


Fig. 1—Showing how the scale or grease on the walls of the cylinder jacket resist the passage of heat, from the cylinder and walls to the cooling water.

atmosphere. A gallon of water, as explained above, weighs 10 lbs. and it will absorb 10 B.Th. units for every degree F. its temperature is raised. Obviously the quantity of water that will do the work of keeping the engine cool, depends upon the number of degrees its temperature may be raised in passing through the cylinder jacket. This evidently depends again upon the number of degrees that will be taken out of it in passing through the radiator, and this again depends upon the speed of the car.

For practical purposes it is always wiser to work to the worst conditions, and the radiator therefore should be large enough to take out the necessary number of heat units from the cooling water, when running at

its lowest speed, as when going up hill. If the cooling water can only be allowed to increase 10 degrees in temperature; that is to say, if the radiator can only take out 10 degrees, it is evident that 6 gallons per minute must circulate through the water jacket, the same speed of course being maintained in the radiator. If the water can be allowed to rise 100 degrees in temperature, 0.6 of a gallon per minute, or say 36 gallons per hour will answer the purpose. In the United Kingdom, the best practice for fuel efficiency is found to be with a water temperature in the water jacket of about 160 degrees F., the water being cooled to about 120 degrees F. in the radiator, or a cooling effect of 40 degrees. Under these conditions the quantity of water required per minute, to take out the heat liberated as explained above, would be $1\frac{1}{2}$ gallons.

The quantity of heat that will be taken out of the cooling water in the radiator, depends directly upon

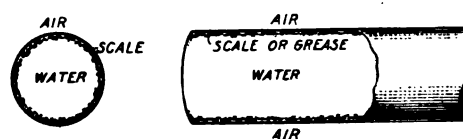


Fig. 2—Diagrammatic section of a radiator tube, showing how the scale or grease resists the passage of heat from the water to the air outside.

the surface exposed in the radiator to the action of the air passing through it, directly to the difference of temperature between the air and the water, and directly again to the speed at which the car is travelling. And here comes in the point mentioned in the previous article. Assuming that everything has been arranged satisfactorily, that the heat delivered to the water in the cylinder jacket is taken out of it in the radiator when the car is running at its slowest speed, if a deposit now occurs, say in the radiator, where it is as likely to occur, as in the cylinder jacket, the rate at which the heat is taken out of the water, will be immediately reduced, and the temperature will rise. If we suppose that the rate of cooling in the radiator is reduced by 50 per cent., this will mean that with the conditions given above, a cooling effect of 40 degrees in the radiator, the quantity of water circulating would require to be 3 gallons per minute, instead of $1\frac{1}{2}$ gallons. Under the conditions ruling in motor car work, the required additional circulation cannot usually be obtained, and the result would be, that the water passing through the radiator would not be cooled to the full 40 degrees, probably only 20 degrees, and the temperature of the walls of the cylinder must steadily rise, leading to the troubles that have been mentioned on so many occasions in these articles, of back firing, early firing, carbonization of the lubricant, and so on.

Further, as pointed out in the last article, the deposit upon the surfaces of the cylinder and of the radiator, tends to reduce the velocity of the water, so that there will be a tendency to a still further increase of temperature in the cylinder walls. It will be remembered that with the thermo syphon arrangement, the force tending to cause circulation of the water, is strictly limited, and that it depends upon the difference of temperatures at different parts of the apparatus. As the difference of temperature decreases, so does the impelling force in the water.

To show how important this question is, it may be mentioned that Prof. Thurston, who is well known on both sides of the Atlantic, as one of the leading authorities on boiler construction, estimates that a deposit of 1-16 inch upon the flue of a boiler furnace, reduces the efficiency of the boiler by $\frac{1}{8}$, and that the loss increases with the square of the thickness of the deposit. Another eminent mechanical engineer, who

is also a special boiler expert, estimates that 1-10 inch of scale offers the same resistance to the passage of heat through it, as 10 inches of iron, and further, with a layer of oil 1-100 inch in thickness, offers an equivalent resistance to the 1-10 inch scale, or the 10 inches of iron. In Figs. 1 and 2, the writer has shown diagrammatically, the action of the scale in resisting the passage of heat.

Mudguards.

It appears to be an open question whether the mudguards of a car should be made by the chassis manufacturer or by the coachbuilder. Only too often one meets with examples of a very poor description which reflect credit on neither party. Some fall short in the matter of appearance, others in utility, or, maybe, ease of detachment.

Mudguards—back as well as front—should be easily detachable and also capable of rapid and secure attachment. This entails some kind of mechanical joint, and seems to come more in the province of the chassis maker, especially as it requires fitting to the frame. The mudguard stays are very often made too heavy, and this by reason of bad design or wrong material. A light steel pressing would answer the purpose much better than $\frac{1}{2}$ -inch diameter wrought-iron stays, which, in addition to their excessive weight, seem particularly sensitive to vibration and liable to break at most inconvenient moments.

It is very difficult to specify the best material of which to make the wings. Good "patent" leather sewn on to a metal frame makes a type which is most excellent in use and free from rattle, but is somewhat expensive if well made, and seldom fitted unless specially ordered. This type also requires a certain amount of care and "elbow grease" to keep the leather in a good condition. Metal guards are cheap to make, but have their disadvantages. The paint on the inside invariably chips off; they are easily dented, not only accidentally, but also by stones thrown up by the wheels, which in addition make an unpleasant noise.

The Steering Gear.

Some car manufacturers do not seem to feel that the steering gear is the most vital part of the car. It may not be needed often, but when it is really a necessity it may be able to save both the car and its occupants from destruction. It should not only be made substantially but as simple as possible and durable. The joints should be made of the ball type for this can be made adjustable, but the same cannot be said of the pin joint. It is useless for the makers to assure us that the pin joints are durable.

The covers to steering joints are fastened very often like a man's glove with spring buttons, and keep the dust out just about as well. The worm and segment are better than the screw and nut device, in that there are fewer parts and consequently less lost motion. The trouble with both systems is that in proportion to the load there is inadequate bearing surface, and also that in a large number of cars there is no means of taking up the wear of a worm. An adjusting nut is often provided, but this only makes the steering stiff and does not take up the wear.

With the worm and segment the steering may not be theoretically irreversible, but it is so in practice on account of inertia and friction.

When treating cuts in tires, inflate as fully as possible while inserting the tire stopping. Deflate slightly after leaving for some hours.

LEG ROOM.

How It Is Affected by Position of the Steering Gear.

Just how the driver of some cars escapes paralysis is difficult to imagine. Cramped positions are the rule and not the exception. Fig. 1 is one of the most uncomfortable driving positions imaginable. There is too much leg room, and the "far off" position of the steering wheel is very tiring to the arms, besides making it difficult to obtain any support for the back.

In Fig. 2 there is not enough leg room, and in this

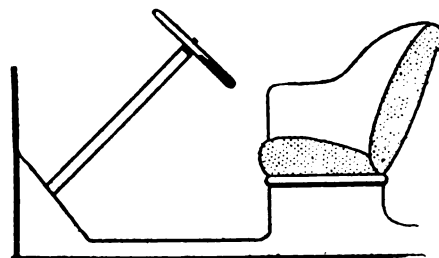


Fig. 1.

position driving is almost as painful as in Fig. 1. The steering wheel rim is so close to the seat that the driver is said by a severe but waggish critic to have to get into his seat with the aid of a shoe-horn. Both these defects are generally the fault of the body designer, and it is surprising how frequently these mistakes are made.

Fig. 3 shows approximately the most comfortable position of the steering wheel and foot-board in relation

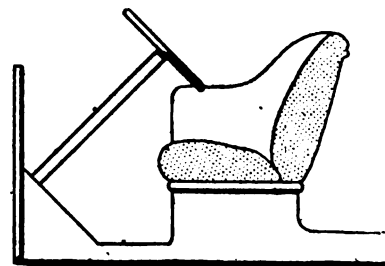


Fig. 2.

to the driving seat. There is just enough leg room, and the wheel is just close enough to the driver to allow the arms to assume a restful position.

In Fig. 4 when the seat is lowered, as in the case of the popular little two-seaters, the relative height of the steering wheel rim above the driver's seat remains exactly the same, although, of course, the steering column assumes a greater rake or incline, and, as can be seen in

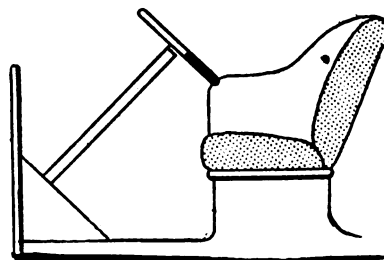


Fig. 3.

Fig. 4, considerably more leg room is required. Undoubtedly this inclined position of the steering wheel is best from a driving point of view, but whether sitting so low is the more comfortable is a matter of personal choice. The four views show the desirability of adjustable driving seats. Vertical adjustment does not matter, as so long as the seat is not too high an extra cushion will put matters right. Horizontal adjustment is most important, and if the seat cannot be adjusted in this way great care should be taken to see that it is put in the

right position when the body is first fitted to the chassis.

Some advocate adjustable steering columns, and there is much to be said in favor of these, but there is still more to be said against them, as they would induce

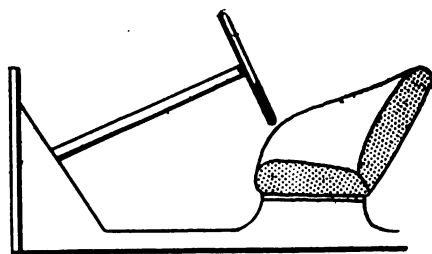


Fig. 4.

far more complication than an adjustable seat. Not only so, but no firm at present fits adjustable steering columns.

SIMPLE VULCANIZING.

Points for Those Who Want to Make Sectional Repairs.

It is not worth while for even an ambitious car owner to attempt completely putting on a new tread for a tire. It is too hard a job and the necessary vulcanizer costs too much. But it often pays the owner to do small or sectional repair work, for a vulcanizer to do this is not expensive nor is the work difficult. See that the tire to be vulcanized is dry. Exposure of the damaged part for a short time on the vulcanizer to a warm temperature, or to a pressure not exceeding ten pounds, will effectively drive off the moisture. Dry cloth or cotton wool should be inserted between the tire and the apparatus to absorb the moisture.

Vulcanizing compounds are well-balanced mixtures in which are embodied the chief materials of the tread, body, and tube. It is suitable for the repair of each, but each part requires different time and temperature or pressure. Thus the repair of a deep cut penetrating through the body will require a more prolonged vulcanization than the repair on the tread or a puncture of the tube. Remember that a prolonged exposure at a low temperature is better than one for a short time at a high temperature. The less heat, so long as vulcanization takes place, the stronger and more durable will be the repair and the better the condition of the rest of the tire.

Heavy repair work should not be subjected to high temperature immediately. A gradual rise of from five to ten minutes should be given, so that the heat can gradually penetrate, otherwise the job will not be successful.

The parts of the cover or tube to be reconstructed should be trimmed with caution, thoroughly freed from dirt, moisture, grease, or other matter, and then roughed with a rasp or sand-paper. A foundation is thus laid for a secure attachment of the compound to the vulcanized rubber.

The compound should be dissolved in naphtha or benzine, and should be thoroughly stirred before being used, for the materials of which it is composed will separate, and as the mixture is made up of carefully weighed proportions, the absence of any part will have a bad effect upon the result.

When preparing the patch, build it up by placing one ply of compound upon the other, using the hand roller, until the desired thickness is reached. Care must be taken to prick all air bubbles and the sheet of compound being used should be wiped with a clean cloth moistened with naphtha. This clears away dust

and imparts a stickiness to the gum. The sheet is then cut so that it will fit snugly the cut or burst. The parts to come into contact, both on the patch and the tire, are then solutioned, the section on the tire being given three coats. The solution must be dry before the patch is applied, when if tested with a finger it is adhesive and yet remains firm. The renewed part is then prepared for the vulcanizer. If it be on the tube, a piece of light cotton cloth is placed between the vulcanizing surface of the apparatus and the patch. The cloth should be slightly moistened. This enables the operator to smooth it out, and eliminates the possibility of lines or grooves appearing on the patch during vulcanization, through irregularities on the cloth's surface. Benzine or naphtha sparingly applied will help the cloth to leave the patch easily.

A piece of paper must be introduced into the tube before the patch is put on, to keep the repair from adhering to the inside of the tube. French chalk should be used only if necessary.

The new part of the cover should be slipped over the mandrel of the vulcanizer, and tightly bound with strips of cloth which should be damped as described. The repair is then arranged on the vulcanizer, under gentle pressure, so that the surrounding parts of the section of tire and not the soft "gum" will sustain the pressure. The compound should be treated with regard to time and temperature, as stated by the purchaser.

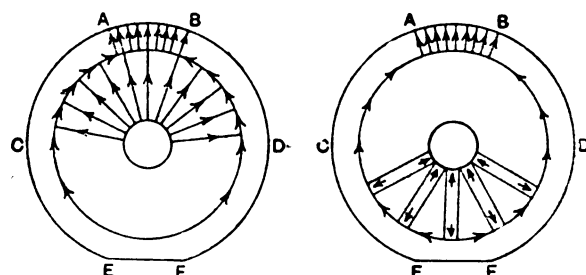
A thumb-nail test will indicate if vulcanization be complete, for under hard pressure no permanent indentation should remain upon the repair. Although a slightly under-vulcanized repair on the cover is preferable to one over-vulcanized, the object should be to bring out the distinct qualities of the compound used. With regard to the inner tube, a slightly under-vulcanized condition is perhaps the more desirable.

WIRE OR WOOD WHEELS.

A Good Word for the Strength and Other Merits of the Wire.

For some unknown reason the public does not take kindly to wire spokes in wheels or in the wire construction, much preferring the usual artillery wood wheels which are the common form.

At the Grand Central Palace show one low-priced



car had wire wheels on its cheapest model and wood wheels on the higher priced car. Everybody wanted the wood wheels, and possibly because the high-priced cars all have wood wheels. But as a matter of strength and durability, it is doubtful whether they are as strong. It must not be forgotten that the whole principle of wire spokes is different from that of wood spokes, and in a recent test made in England, the wire wheels proved the stronger, both sidewise and straight. Again, some claim that the pulling force being both ways as it were, on the wire spokes, they do not wear the tires as much as the wood wheels.

The manner in which they both transmit the strains

consequent on the stresses to which they are subjected may be illustrated approximately in the accompanying figures. It must not be imagined that the rim opposite A C and B D receives a smaller pull from the tire per unit length than that opposite A B; the pull is the same, but it is used up as a lifting force by having to oppose equal and opposite forces exerted on the rim facing the tire between D F and C E. The lifting pull on the rim of the tire between A and B is not opposed by any corresponding pull from the tire wall between E and F, and is, therefore, free to carry the rim and wheel.

It is obvious at once that a wire wheel is more efficient for its work than a wood wheel. The tendency of the tire to make the wheel expand (amounting to a resultant centrifugal force of roughly 2,000 lbs. in an ordinary sized wheel, with an air pressure of 70 lbs. per square inch) is resisted by the rim which it puts in tension. The tension of the spokes lends support to the rim in resisting this tension, while the support of the hub and load passes directly down from the tire above to the hub below through the spokes in tension.

In the case of the wood wheel the tendency of the tire to expand is likewise resisted by the rim, but by it alone. The spokes can lend it no support if required to prevent expansion. On the contrary, the weight of the loaded wheel makes matters worse for the rim, adding an additional bursting thrust, tending to force the lower half of the rim away from the upper half, which resists its descent.

A wire wheel is not constructed to resist pressures as it is to resist tensions, and the thrusts it would receive from the ground contact when rough would tend to buckle upwards its unsupported rim—supported neither by the tire pressed up towards it, nor appreciably by the spokes, nor by the tensile strength of the rim, but dependent merely on its own rigidity and power to resist being bent. The strength of a wire wheel lies largely in the fact that it is hung, with all its strains resisted by metal tension.

Lubrication.

A gasoline engine requires constant lubrication in a cylinder-head where tremendous heat is developed by the explosions of gasoline. The perfect oil for this purpose must be of sufficient body to withstand this heat, and at the same time be light enough for the residue to be carried off through the exhaust, instead of remaining on the piston head and valves as a carbon deposit. Such oil is not cheap. It is not necessary for the car owner to bother with tests. The only satisfactory method of judging the quality of an oil is an actual trial. And such a trial requires more than one gallon. No oil, however poor, is going to show its bad effects at once. It is only after continued running that trouble begins to crop up. On the other hand, the effect of good oil is negative, because its worth is shown by the absence of trouble. Don't think you can afford to buy cheaper oil simply because you have not been having any difficulty with a good brand.

Here are some pointers which are supplied by the manufacturers of Panhard Oil: If your exhaust smokes it is a sure indication that too much oil is being fed. Feed as much oil as you can without causing the car to smoke. Don't judge oil by the color or by absence of carbonization. Both points are testimony but not positively proof.

Nuts on a car are not necessarily right-handed. Many threads have been stripped owing to a non-appreciation of this fact.

HOW TO SOLDER.

A Useful Process for Home Repair Work on an Automobile.

In view of the number of joints about the engine of a motor car, the radiator and gasoline tank, that depend on soft solder for their union, it is advisable for every car driver to acquire knowledge of how to properly re-unite them, as well as to include the necessary details in his outfit as a precaution against being stranded miles from anywhere. It is imperative that the surfaces to be united should be thoroughly clean and bright, devoid of dirt, grease, and scale, and the true surface of the metal exposed to the action of the flux. Secondly, unless the nose of the soldering iron is thoroughly clean and well tinned, it is impossible to get solder to run properly and unite, however clean the surface of the work may be.

The reason why soldering irons are often discovered in a lamentable and useless condition is owing to the want of a little care in heating up, and the absence of the necessary accessories which would ensure the bit, while in use, being maintained in perfect working condition, despite its size or the number of times it may be found necessary to reheat it. Directly the temperature of the iron is allowed to approach red heat, the tin is burned off its nose, and the copper scales and carbonizes; it is therefore essential that, while maintaining a high degree of heat to enable the best results to be arrived at, the temperature must not be carried to such a degree as to necessitate frequent refiling and retinning.

The first point to aim at towards becoming a competent manipulator of the soldering iron is to put it in order. There are two methods that can be employed—one by contact with a sal-ammoniac block and the other by dipping. Personally, I prefer the former as being best and most efficient, not only in the preliminary tinning of the nose of the iron, but in maintaining it in good working order. The latter can, of course, be done equally well by dipping, but it means either that the nose of the iron has to be dipped each time it is removed from the fire into the soldering flux, and thus quickly convert it into mud; or, as an alternative, reserving a separate receptacle containing sal-ammoniac in solution; this does not answer nearly so well as the block, and is always liable to being spilled and to evaporation. Therefore, procure a fair-sized block of sal-ammoniac and embed it partially in a block of wood as a rigid base and to protect it from breakage; then scoop a shallow hole in the center, which latter is to contain a globule of solder. Now heat the soldering iron to a dull red heat, quickly grip it in a vise, and file up all four faces of the nose, and slightly round the corners and point (any old file will answer for the purpose), and then insert it in the hole in the sal-ammoniac block, giving it a few twists, simultaneously feeding a little solder against the nose, which will result in the copper iron being cleansed or fluxed and tinned at the same time. If the iron has previously had all the scale removed by filing, the nose will be well tinned close up to the shoulder, and, with proper care, the application of its nose to the sal-ammoniac and solder each time it is removed from the fire will clean and keep it in working order.

With regard to the flux, this, for ordinary work, consists of what is generally termed spirits of salts, but more correctly is hydrochloric acid killed by or saturated with zinc, after which it is usually termed killed spirit. To kill it for after use, a stone pot is the best type of receptacle in which both to kill it and to use it, especially when using it also as a dip for the

copper. The pot should be about one-third full of acid, carried out into the open, and sufficient strips of zinc added to kill and take the fire out of the acid. The acid always boils and gives off noxious fumes and vapor, with the natural result that if the acid is killed inside the workshop any tools or machinery will be rusted by it. All work to be soldered must be thoroughly cleaned or scraped, a little of the flux applied, and a hot iron used to melt and run the solder, remembering all the time that a thin neat joint is stronger and more workmanlike than a thick, clumsy deposit.

Of course, in electrical work, especially when soldering wired joints, resin must be substituted for the acid flux, otherwise chemical action will be set up, and the wires and their insulation destroyed very quickly. In soldering zinc the unkilld acid is the correct flux to use, and it is well, in all cases where acid flux is employed, to well wash or wipe the parts after soldering.

Cast-iron can be soldered as easily as any other metal, provided the breakage or joint is filed down to a true surface, cleaned, and made slightly hot.

We now come to another aspect of soft soldering, termed "sweating." This is performed partly with or entirely without the aid of the copper end—in the former case, chiefly in coating the joint surfaces of bearing brasses as a preliminary to securing them together, preparatory to boring and turning them, the whole when evenly coated being made sufficiently hot to melt the solder, so that, when the two halves are closed together in a vise or under weights, the surplus solder will be squeezed out and the two parts unite. It must be borne in mind that the closer the joint, the stronger will be the resistance to their breaking apart in the process of machining.

The process of simple sweating applies mainly to pipe joints, such as the union connections of gasoline and oil pipes. There are some thousands of such joints made daily, and it would surprise a vast majority of the makers if they were informed that they were anything but sound joints. To properly unite a pipe and union, the end of the tube must be a good fit in the union, well cleaned and tinned, which may be done by holding the pipe in a blue gas flame (or spirit flame), dipping the solder in the acid, and applying it to the tube, and when evenly coated just wiping it round with a clean rag. If the union is clean, it will only be necessary to dip the cold tube in the killed acid and insert it in the union, having first warmed the latter sufficiently to enable the surplus solder to give way. The whole is then heated up to a heat sufficiently high to melt a little solder off the end of the stick, and by the continuous application in minute proportion of both acid and solder, and continuous heat, the solder can easily be induced to run through and make a perfectly full and sound joint, which nothing short of heat will dislodge. A few minutes spent in experimenting will readily demonstrate the efficiency of the joint made in the way directed.

Making a Loose Bonnet Silent.

To prevent noise from a loosely fitting bonnet, a strip of round lamp wick fastened along the ledge on the radiator on which the bonnet rests will often render a noisy bonnet quite silent. The wick can be fixed at intervals along the ledge of the radiator by means of drilling fine holes and threading wire through the holes and over the wick.

Benzine is better than gasoline for cleaning out cuts in tires, as it mixes better with water.

Folding Seats.

The illustrations show two folding or collapsing seats which are gaining popularity in England. The first illus-

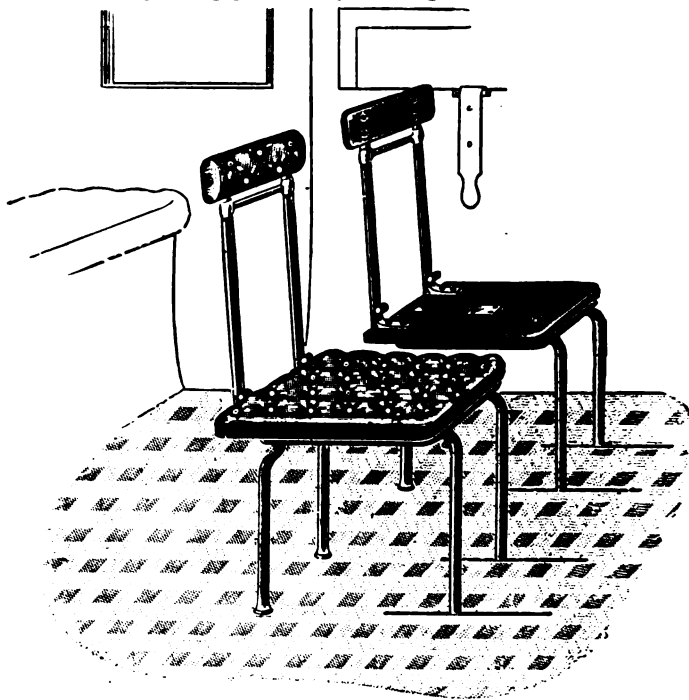


Fig. 1.

tration, Fig. 1, shows the seats in position to face any direction, and to fold up against the front lining boards.

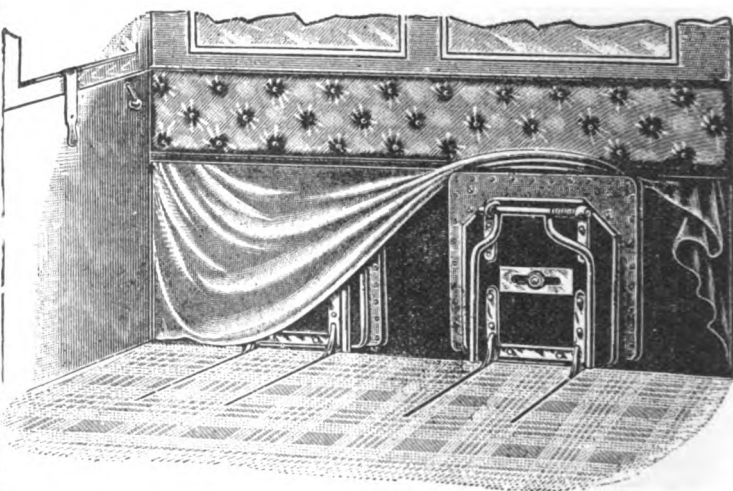


Fig. 2.

Fig. 2 shows them under a fall of the front lining boards when not in use.

Two Spark Plugs.

Again referring to the matter of using two spark plugs in each cylinder instead of one plug. The use of two plugs would seem to be an unnecessary arrangement in that the labor of caring for the plugs is doubled and the chances of short circuits from dirt or soot are greatly increased. One spark plug as used at present, if kept in good condition, is all that is necessary.

To use two spark plugs instead of one and obtain satisfactory results a coil of larger capacity must be provided and the two spark plugs connected up in parallel. The capacity of the coil should be sufficient to produce a good fat red spark at each plug simultaneously. This arrangement in theory works out very fine but in practice is unnecessary.

TRouble DEPARTMENT.

Questions answered by the Y. M. C. A. Automobile School, 322 West 57th St., New York.

This department is intended to be a "trouble clearing house," and it will be esteemed a favor if our readers will add information to it from their own experience or knowledge.

Cylinder Trouble.

Question: We have a Model 10 Baby Tonneau Buick Automobile (new this year). From the very first we have had to clean the spark plug in the front cylinder about every 50 miles in order that the motor will not skip. This cylinder and the second (but not so much) seem to be oiled so freely that the oil gets into the plugs and hinders the sparking. We have used four plugs (Champion) but the porcelain of them has broken after very short use. There seems to be a little thump in the motor, but we thought it was due to the hitting of the valves against their seats. When the car is running on the magneto very slowly it jumps. Kindly give us your opinion as regards the correction of the above.

Answer: Adjust the lubricator so that less oil is fed to the forward compartment of the crank case. The thump no doubt comes from carbon collected in the cylinder which is the result of feeding too much oil. This carbon becomes incandescent and ignites the charge while the piston is still traveling up and consequently causes a knock. To remove the carbon it will be necessary to take off the cylinders. The magneto may be slightly out of time so that it does not give a very hot spark at low speeds, but it is advisable to consult an expert before changing it.

Easy Steering.

Question: Is steering made easier by offsetting spindles on front axle? Kindly explain and illustrate if possible. I do not quite understand how the dirve shaft in full floating rear axles is kept from coming out.

Answer: If you mean by offsetting that the spindles are placed slightly back of the pivot pin in the steering swivels, we can say from experience that such construction does not materially help steering. Slight foregather, which means that the rims of the front wheels are about $\frac{1}{2}$ -inch (no more) closer together at the front than they are at the rear, makes steering perfect. Where a floating rear axle is used, the rear wheel revolves on two roller or ball bearings which are fastened to the hollow tube of the axle itself by means of large diameter nuts. The driving shaft is slid into this hollow axle and one end being squared, connects to the differential gear. The other end connects to the hub of the wheels by means of a dog or disc with notches cut in it. The hub cap covers the opening through which the drive shaft is inserted, and as long as it stays in place the driving shaft cannot come out.

Starting in Cold Weather.

Question: I have a two-cylinder air-cooled Breeze motor and since we have been having cooler weather I have had a hard time starting my engine. I am obliged to prime both cylinders and open the throttle two or three times and the spark about one-third. Sometimes it fires back into the carburetor. I wish to know what would be the best way to obviate this difficulty.

Answer: Sometimes a loose piece of waste saturated with gasoline and placed over the air inlet of the carburetor will assist starting. Raising the float level or adjusting the spray nozzle for a little more gasoline may help, but in stubborn cases starting may be made very easy by pouring hot water on the inlet pipe and saturating a piece of cloth placed around the carburetor with it.

The Mechanical Intake.

Question: If you can give space to this lengthy complaint, and your journal is as popular as it deserves, I have hopes that this letter will fall into the hands of some owner of the "Winton Machine, Model C, 1905," for this is my machine, and will appreciate any efforts through the medium of the AUTOMOBILE DEALER AND REPAIRER or personal letter.

As you possibly know, my engine is rated at 16 to 20 H. P. automatic intake valve, controlled by air. To get the best possible horsepower the air must be kept at good pressure and that I find difficult because of the leaking around the intakes, if large enough to work freely in a motor that has lost pressure from four or five years' use. But even when in good trim and at its best the motor does not develop the horsepower necessary but compels me to resort to low speed gear to make hills that the ordinary car of to-day will go up with practically no effort.

The leakage in the air train and especially the intake valves is very hard to control and unless it is controlled kills what power I have, and at the present time do better than paved and practically level streets. If I put in new intakes and get air in first-class condition I yet lack power, and you that have found yourself pushing on the steering wheel at every little hill know there is little or no pleasure in driving.

Have you ever made a change in motors to the mechanical intake? And is it advisable? And can you refer me to a good motor manufacturer that would make me a reasonable price on a motor? The Winton Co. claim a 30 H. P. motor too powerful for the transmission and differential, yet they stand the strain of the low gear and there is not much danger of ever sticking when in good condition and on the low gear, and it would have to be a powerful engine that would put that same strain or two thirds or three quarters that amount when in high gear. The remainder of my car is in first-class condition, and I like it, my trouble is engine trouble. * * *

Answer: The writer cannot recall any particular case where a change in motors to the mechanical intake has been made, but would suggest that the British-American Co. of Bridgeport, Conn., makes motors that would probably suit you. The expense necessary, however, would not warrant the change in a 1905 Winton machine.

Another Knock.

Question: I am driving a Brush runabout, one cylinder, four-cycle motor, which is comparatively new—driven some 5 or 6 months. A knock has recently developed in the engine, which I am unable to locate—connecting-rod bearings are tight and in good order. I have cleaned the motor thoroughly several times recently, and the knock disappears for a short while, but after driving the car some 25 miles it develops again. The timer is O.K. and I have a good fat spark. Is this knock possibly occasioned by leaky valves? The valves have never been ground. Compression seems to be good.

Answer: When you cleaned the motor do you mean that you took the cylinder off and removed the carbon from the inside of it and from the top of the piston? If you did not, you will probably find that doing so will overcome your trouble. Care should be taken that all of the carbon is gotten from the heads of the valves and sides of the valve pocket also. If all of this has been done, try feeding more oil until a small volume of blue smoke is seen at the exhaust. A leaking valve should not cause a knock but if the cam follower which operates the valve is not sufficiently lubricated, it might stick and cause a loud tap.

The Gas Tank.

Question: I enjoy reading the *AUTOMOBILE REPAIRER AND DEALER* very much and would like to have you answer the following questions:

(1) What kind of gas is the gas tank usually charged with?

(2) With a suitable generator and hand pump would it be practicable and economical for me to charge my own tank with acetyline gas?

Answer: (1) Acetyline gas.

(2) It would not be economical to charge the tanks yourself, as the cost of the necessary equipment and upkeep would exceed the price of a regular tank and the cost of recharging it when necessary.

Compression and Power.

Question: I have a Lambert automobile and it runs all right when cool, but when it gets hot it loses its compression and power. It has a water jacket around the piston (or cylinder) and the head is air cooled. The head gets red hot.

Answer: Does the water get hot and steam? If so, examine the pump and see if it is worn; see that there is no clog in the radiator or piping system: If the carburetor is not adjusted properly it will cause the motor to overheat, as will running the engine with a retarded spark. Poor compression or insufficient lubrication will also give trouble.

Carburetor Trouble.

Question: Is a carburetor after the gasoline is shut off from the tank in the evening supposed to be dry in the morning? Thank you in advance for an answer through your Trouble Department. * * *

Answer: The carburetor should retain the gasoline for an indefinite period after the supply has been shut off, unless there is some leak, which is apparently your case. As to the remedy of the trouble it would depend altogether upon where the leak is and the probable means of fixing it.

A Misfiring Trouble Remedied.

From E. J. B., New York.—My magneto, an old style Bosch, had been giving considerable trouble for about 2,000 miles. I could not find out the reason of misfiring irregularly, which was not confined to any particular cylinder. The fiber of my distributor was cracked, evidently from heat. I thought the crack probably filled with carbon dust, and carried the current from one carbon to another. I had a new distributor made; there was no improvement in the working of the magneto. I took down the whole machine and examined it thoroughly, but could find nothing wrong. But when fitting it together again I found that there was end play of fully 1-16th of an inch in the armature. This affected the make and break to such an extent that it was impossible to set it in any intermediate position to assure regular firing. I put a copper washer between the end of the armature (on the spindle) and the rear end plate. The magneto now works as new.

Old Tire Casings.

From T. W. Ingersoll, Minnesota.—I should certainly appreciate any information you can give me either in a personal letter or through the pages of your journal as to the following: As you may know, every automobilist accumulates more or less used up tire casings. We pay so much for them at the start and receive so little from the junk dealer at the finish. It is my impression that 6 or 7 cents a pound is about the limit with us. Now, it is reasonable to suppose that there must be some keen

market for cast-off tires, in some branch of some industry this material must certainly be used with profit.

I am writing to know whether you can give me any pointers, which will make it possible to sell greater or less quantities of old tires at a reasonable profit. Any information or suggestion you can give me will be appreciated.

A Noisy Transmission.

Question: I am the owner of a model 21 (1907) 2-cycle Rambler car, which I am about to overhaul principally with the idea of doing something to render the transmission more quiet. I find that the transmission on this car runs pretty noisy while running on neutral or low gear on account of inherent defects in same. Could you suggest the best means of eliminating the rattling noise made while running as above stated, outside of replacing the entire set of gears. Possibly some other owner of this model car could suggest a remedy for the trouble.

Answer: Bushing all of the gears so that there is no play in the bearings will help. Using a medium weight grease will also give good results, but as a general thing when a planetary gear gets noisy from wear a new set of gears will be found necessary to entirely eliminate the trouble.

"Woodworth" Treads.

In the November issue under the heading "Trouble Department" the owner of the Ford Model N, requests that some party familiar with the "Woodworth" tread give an account of their experience. I have a set of Woodworth treads which I use on the rear wheels of which weighs 2,500 pounds. I found that to obtain the desired result it was necessary to have my tires pumped hard to prevent the treads from creeping as much as possible which causes friction between the tread and tire. There is no question about the saving on your tire by using this tread as it completely protects the rubber tire from contact with sharp stones and frozen ruts in the road.—W. M., N. Y.

On the Spark.

If one would start his motor "on the spark," he should speed his motor up, just before stopping it, by opening the throttle wide. Then, if the spark is cut off, a full charge is left in the cylinder, to be ignited when another start is to be made.

Make a Note of This.

Test the batteries occasionally; see that the spark coil buzzes in tune; keep the spark plugs clean and see that the current passes through them; never allow the motor to run without lubricating oil or to become overheated; don't try to run the motor with the water circulation shut off.

A Freezing Mixture.

A good freezing mixture is one part glycerine to three parts water in moderately cold weather. In extreme cold mix one part glycerine to two parts water. Too much glycerine tends to clog the tubes. Chemically pure glycerine is not necessary.

Lubricating the Gear Case.

When the hole in a gear case is so small as to make the feeding of grease through a gun extremely difficult, screw into the hole temporarily an ordinary compression grease cup of large size, by which means a full charge may be inserted.

The Brake Rods.

Rattling brake rods are annoying. Nothing of the kind is experienced in the case of some cars, but in others, in some cases, the wire cable has been displaced by complicated rod work, although the former is quite as satisfactory, and if properly supported, is sufficient and does not wear to any extent. It has its faults, but they are small compared with those of the innumerable pin joints employed with rod work. But if pin joints are to be satisfactory they must be very accurately made and should be hardened. Unless this be done they

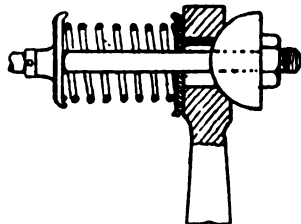


Fig. 1.

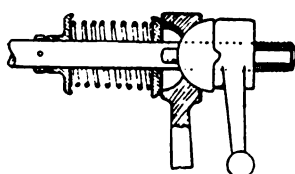


Fig. 2.

wear oval very quickly. If motion is only to be transmitted in one direction (pull), there is nothing to beat the ball and cup joint held together by a spring, Fig. 1. This does not rattle, and accommodates itself to any angle (in two planes) within limits. If it be desired to make this joint easily adjustable and self-locking, a flat should be made on the rod and the bore of the ball piece formed to correspond. Fig. 2. I have purposely not shown a thumb-screw in Fig. 2, as I do not like the type usually fitted. The ears are always made

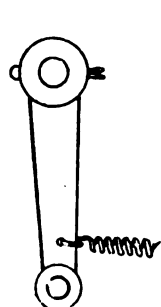


Fig. 3.

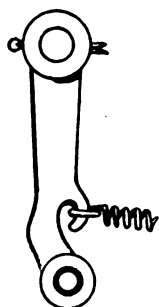


Fig. 4.

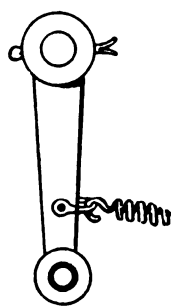


Fig. 5.

too short and weak, and in consequence they are very hard to operate, and occasionally break off in use.

Release springs at the various points of brake motion are often very badly fitted. A hole (usually much too small) is drilled in the lever, and the poor owner is expected to wiggle the hooked end of the spring through it, Fig. 3.

The lever should be formed with a suitable slot, Fig. 4, or else provided with a substantial bent link and pin, Fig. 5.

Clean Mud Shields.

Too great care cannot be exercised in keeping the mud shield below the engine and gear-box clear and free from volatile oils. Despite supposedly adequate provision for drainage, the average undershield usually contains a small-sized pool of mingled grease, water and oil, which is as tinder to a possible spoonful or two of gasoline, such as may trickle from carburetor at almost any time.

Care for Tires.

A little attention to spare casings and tubes before putting them away will mean added service in many cases. If there are any cuts in the shoes they should be filled with a good cement, and if there are any spots where the fabric is exposed it should be seen to that these are perfectly dry.

Garage Heating.

Methods of heating the garage must, of course, vary according to locality, size of the building, and other conditions.

As the many owners of private garages have either steam or hot water heating in their homes it would be a simple matter to run piping and install a radiator of sufficient size in the detached garage. In case hot water was used, a suitable drain would necessarily be required so that in extremely cold weather, if the heat was not desired, the water could be drained so as to prevent freezing.

The ordinary garage for one car can be heated economically by means of an oil stove encased in fine mesh gauze. It is impossible for flame to pass either way with this arrangement, and it is therefore very safe and portable. If cheap gas is at hand it may be piped to the mixer from outside the building. A pilot light can be left burning, so as to bring the heater into action without matches.

Steam heat is not satisfactory unless steam be kept up constantly during severe weather. If the fire is ever allowed to go down no steam is generated, and the temperature in a frame garage falls rapidly, and there is always danger, under these conditions, of freezing the water in the radiator and cylinder jackets. Even if they be protected by the use of an anti-freezing solution, the steam radiators in the garage are likely to be burst. Hot air generated in a separate building, lower than the garage, or in a cellar, may be used, provided always that the opening for the register in the garage is never in the floor. It should be in one of the side walls, at least 2 or 3 feet above the floor. There must be no possible chance of any spark ever reaching the garage through the hot air pipe.

A safe and economical method of heating the garage is by means of hot water. A small stove surrounded by a water jacket made for heating small buildings is on the market. A hot water radiator of sufficient size and an expansion tank are placed in the garage. They are connected with the stove which may be conveniently placed in a small lean-to building outside the garage or the cellar of the residence. In the latter case the pipes, well protected with some non-conducting material like asbestos or magnesia, are placed underground. A low fire in the stove will be satisfactory during the greater portion of the winter. In severe weather it will only be necessary to open the damper a little wider and use more coal. In this system, should the fire go out through carelessness, the water could not reach the freezing point for several hours.

A Clogged Circulating System.

A badly clogged circulating system may be thoroughly cleaned by a solution of soda, followed by hydrochloric acid. The former dissolves the grease in the tubes, while the latter removes the rust and scale. In the average case a 25 per cent. solution of the commercial grade of the acid would probably do the work in from fifteen to twenty minutes.

How to Stop.

Never draw up with the brake if avoidable; it wastes tire rubber every time it is done. Instead, withdraw the clutch in anticipation of the stopping point and just make the standstill with the brake.

The great difficulty with overheated cylinders is lubrication. If it were not for that the hotter the cylinder walls without preignition the better.

A Live Touring Map.

Following the right route, the most difficult task of the average touring automobilist, will be made easy with a recent invention. What this means only the man who has lost his way in a strange territory can readily appreciate.

The invention is called the Jones Live Map. The device is in the shape of a meter connected through a flexible driving shaft by suitable mechanism to one of the front wheels of the car. To the meter is attached a disk of paper, the outer edge of which is divided into miles and tenths of miles, each disk showing 100 miles. One is used for each route or part of a route up to this distance, and they can be renewed indefinitely, as far as the traveller cares to go.

On the face of the disk of map, opposite the correct distance, is printed the features of the route, such as the names of towns, the turns, bridges, railroad crossings, etc. The line map revolves in the meter in such a way that each place in turn on the highway is indicated as it is reached, by a fixed pointer. Therefore, when the map tells of a "right turn," a "fork in the road," or gives the name of a village, the car is at that point.

The map contains a mass of information of all kinds. A glance at it will answer any question of the road—mileage and direction—anything that can be predetermined. The flexible driving shaft makes it possible to pass the map for reference to the rear seats, but it can be read from the tonneau when in its regular place in the front of the car.

With such a ready reckoner of the route the delightful uncertainty attaching to touring will cease and some may regret it. The man who likes to guess will find himself at a loss if the pointer is always before him. But, of course, he need not carry a live map. The entire outfit costs \$75, and is thus something of a luxury.

Long and Short Strokes.

Discussion of the length of the engine stroke still continues. One of the engineers of the Corbin Car Co. says: "The advocates of the short-stroke motor claim many advantages for their type. To me it seems that gasoline motors are not like steam, relying on the slow expansion of gas, but are impulse motors, where the pressure is very high for a short time and after that can be practically neglected; therefore the piston travelling an equal distance in the same time revolves the crank further on a short-stroke motor, thereby giving more power. The short-stroke motor has shorter connecting rods, lower cylinders, smaller crankcase and lighter flywheel, all of which saves weight. The lower cylinders give a lower center of gravity, another important feature. The vibration is less with a short-stroke motor because each impulse is applied with a smaller lever arm. For the same reason the strain on the transmission, universal joints and level gears is less like a hammer blow. Other advantages of the short-stroke motor are that it cranks easier, is more economical of gasoline because of its smaller piston displacement, accelerates quicker and is capable of higher speed."

This seems good logic, but better than an argument would be an actual test, and this could be made without much expense. Let there be a single standard when it is definitely settled what is the best one.

Valve Operation.

The position and operation of engine valves on the four cycle engine is important and has not yet been

settled into uniformity. The exhaust valves must be mechanically operated, for they open against the pressure of the gases in the cylinder. The inlet valves may be operated by the suction of the piston as it moves downward drawing in the new charge, but most designers prefer to slightly increase the power of the engine by opening the inlet valves mechanically and thus permit the new charge to enter the cylinder during the downward piston movement, without the formation of the vacuum that would be necessary to suck the valve open if not mechanically lifted. On this account practically all engines in automobile service to-day employ mechanically operated valves for both the inlet and the exhaust purposes. A further reason for this arrangement is the claim that the suction operated valve moves too slowly for the high speeds desired in modern cars, but this is rather a matter of valve design than of actual fact. If the valves are large and as light as may be, they open quickly under a slight suction and close equally quick with the slightest tendency of the new charge to escape through them. It is the belief of some designers that the engine of the future may return to suction operated inlets because of the greater simplicity and consequent lesser noise and possibility of trouble. Whether this will happen, or whether before that date the two-cycle engine will crowd the four-cycle with its valves out of the field remains to be seen.

Chain and Gear Drives.

For a long time drivers of racing cars believed that the chain-driven car had greater speed possibilities than any other form. They pointed to the bicycles with chains, which in numbers far surpass the chainless, and to the races won by the chainless form. But in spite of this good showing, the shaft and gear drives, carefully housed to keep out the dirt and to keep in the oil, have steadily increased in number until they are to-day in the majority. For this growth the housing is undoubtedly responsible, and there seems to be no question that a well-housed set of gears properly lubricated will wear longer, make less noise, and transmit power as efficiently as a chain, especially if the latter be left out in the open, where it may gather dust and grit, or where its sprockets may become coated with mud. The only way to make proper comparison is to incase the chain so that it may operate properly, protected from dirt and carefully lubricated, as do the gears. When this is done the chain is in position properly to deliver the high-quality service of which it is capable.

The incased chain not only does not wear and stretch out of pitch, but is largely prevented by the oil which clings to its surface from rattling and being a source of noise. Chain drives are still found on all sizes of vehicles, and the Cartercar with friction transmission now uses incased chains, and the makers publish some very interesting information regarding the life of chains when incased. They show illustrations of chains that have run 6,000 miles properly protected, and which can scarcely be told from new, while by the side is shown an exposed chain, otherwise the same in surface, which in half the distance wore out so badly as to make it of no further use. They also express such perfect confidence in the service that should be derived from the proper chain as to replace free any chain casings during the life of the car that may be broken or damaged by a broken chain.

Certain it is that if the chain is housed and lubricated with anything like the perfection of the shaft and gear housings it will prove a serviceable drive and possibly the most economical of drives.

NEW FEATURES.

Some of the Leading Changes of the Car of the Coming Season.

This is the way Charles E. Duryea sums up the situation as to improvements and changes of the car of 1910:

The economizing period through which the industry has just passed taught the value of light weight. The reduced tire and maintenance expenses of the lighter cars has been very marked and has done much to widen the range of buyers. And it is a well-known fact that once a man enters the ranks of the automobile users he is not happy until he has crept to the top and driven the most elaborate production he can find.

This simple fact alone does much to stimulate designers to produce for next year better creations than they had last year. The buyer who was pleased by the makers' ideas last year probably will be susceptible again, and, having prospered in the meantime, will buy their more luxurious structure.

Because of these things we find wheel bases again moving forward. It seemed as though these had reached the extreme and would follow a downward course, but, aside from the short-coupled town cars, this seems not to be the case.

This lengthening of base has gone forward with a shortening of motors in many cases. The tendency seems to be toward lighter motors, and with all the cylinders cast in a separate piece. This makes the motors shorter and does not require so much room in the bonnets for passengers, and has been used to the passengers' benefit in several ways.

In some cases the bodies have been lengthened and more leg room provided. In others the seats for the rear passengers have been gotten in front of the rear axle, where the riding is easier. This also makes room for wider doors and more easy entry to the tonneau.

In other cases the extra room has been given to hooded dashes, which, by extending backward over the driver's feet and legs, protect him from the weather and wind, and add comfort, as well as the sporty look so much affected by some users.

In many cases the added length has been utilized to introduce springs, which, in turn, have softened the vibrations and very much helped out the riding qualities of the respective cars. The lighter weight of the last two years has also done much to better the spring action, and there is much evidence that in future, comfort rather than mere speed will take precedence.

There is also to be seen a tendency toward larger wheel sizes. The fact is slowly being recognized that the cycle was not the predecessor of the motor car, and that cycle practice, such as wire wheels and smaller tires, was a mistake. The former was quickly learned, but the latter has been a slower lesson.

A few years ago it was a surprise to find wheels of 36-inch diameter, on any but the most high-priced foreign cars, but this fall we find cars with 42-inch wheels.

Not only in wheel sizes, but in tires, also, do we find an increase. Quite a number have increased the tire section, in spite of the rising price of rubber.

The Cartcar is equipped with three-inch in place of 2*, and four-inch instead of three-inch. The Mora has increased the section of the tires of one model from three inches to four inches, and has kept the tire sections the same on others while raising the wheel sizes.

These are but a few of the visible changes for the coming year which indicate the trend. Among the more mechanical details are to be found like improvements. The industry is moving forward, and many of these changes are due to the experiences found in the great tours held in the West and South.

Makers got a chance to see what buyers of their goods were up against in those less developed sections.

The gospel of large wheels, light weight and large tires finds ready acceptance where the roads are bad. It cannot be argued that the roads should be improved. The automobile must take the roads as they are and let the road improvement follow, and big strides have been made in this also.

In general the improvements are more practical than many seen in former years, and indicate a better understanding of the roads and buyers than in the past.

A New Dynamometer.

Joseph Tracy, a New York consulting automobile engineer, has invented a new power measuring apparatus which he calls a fan dynamometer, which can be employed in testing motors on the block by making suitable connection between the jointed dynamometer shaft and the motor shaft, clutch or flywheel. It can also be used to test an automobile motor in position on the chassis by disconnecting the propeller shaft and substituting for it the jointed shaft of the dynamometer.

The standard dynamometer is designed to test motors of medium sized cars. However, by the use of fan blades of greater or less area, and suitable tachometer scales the range of absorption and measurement of power can be varied between wide limits.

Features of this apparatus which will commend themselves to builders of motors, automobile manufacturers and others include, simplicity, low first cost, compactness, durability and freedom from possible breakdown or interruption of tests, ease with which readings may be obtained by unskilled help, and capacity for continuous tests for long periods without constant attention.

Modifications of the standard apparatus are built to conduct tests of power delivered to the driving wheels of automobiles, either shaft or chain driven. Patents have been applied for on this apparatus.

Friction Driven Cars Gain in Popularity.

It is interesting to note at the automobile show the gain in popularity which the friction driven automobiles have made. In 1905 when the Cartcar was shown for the first time at the Grand Central Palace show, it was looked upon as a freak. At present there are thousands of these cars in daily service. The flexibility of the friction transmission has made it a favorite with nearly all who have ever driven one of these cars. There is no jerking in starting or stopping, no noise when driving on the slower speeds, no racing of the motor, and the car has wonderful hill-climbing ability because all power is utilized to as great advantage on the lower speeds as on high.

A simple test for ascertaining whether an accumulator contains current is to place the tongue on the terminals, when a prickling sensation, but no shock, will be felt if electricity is present.

Should the carburetor catch fire through a back shot, turn off the gasoline and race the engine. This will often suck it out.

THE CHAUFFEUR QUESTION.

Incompetent Men and How They Get Into the Business.

Despite the fact that the market is glutted by those who call themselves "chauffeurs" there seems to be a scarcity of reliable ones. One of the members of the Automobile Club of America was recently asked by a friend to recommend a chauffeur. He said he was sorry he could not do it; he knew where enough of them could be found, but he could not recommend them. He went further than this, and in casting around for a reason why there were not good chauffeurs, he gave out as his belief that car owners themselves had a great deal to be responsible for. He said that in the early stages of the automobile business the novelty of it attracted to the garage and salesroom a large number of "hangers-on" and "loafers," who naturally could not keep a position even if they succeeded in getting one. Yet they succeeded in acquiring a superficial knowledge of the automobile and many of them were employed simply because no others could be had. They found a good many opportunities for "graft" and naturally they were not slow in taking advantage of them. When a young man started in with the intention of being honest, he was soon shown the error of his ways, and initiated into the secrets of dishonesty. At that time, moreover, the pay of chauffeurs went up out of all proportion to the services required, especially if a man were competent. Naturally the incompetent ones shared in a measure in this prosperity. Their salaries and commissions often brought the wages up to from \$40 to \$50 a week, and this naturally attracted others who could not earn one-quarter of that money in any other capacity. Just at present, especially in New York City, there is a great complaint at the number of chauffeurs who take cars out unknown to the owners. In the last week, there have been fully one-half dozen cases of this kind, and two or three serious accidents have resulted. This, however, is a matter that might be easily remedied by the owners themselves, and no matter whether their car is stored in private or public garages. There are cheap and simple devices so that the car cannot be taken out without the permission of the owner, and those who will not employ them should make no complaint if they suffer the penalty. This member of the Automobile Club said:

"The owner of the car can eliminate the graft (commissions) by purchasing personally all that is needed for his car. This he can do by ordering directly from any of the reputable concerns that exist in the city. I investigated my tire bill, and found that my former chauffeur was buying 'seconds' for one-half the cost of new tires. The purchase of each tire netted him about \$15. The firm sold him the 'second' for \$25, and billed it to me for \$50. He received one-half of the \$25 over the cost price of the 'second,' and 10 per cent. of the \$50, so that, as stated, each tire netted him about \$15. I suppose he is doing the same thing with his new employer. The other day, while passing down 'The Row,' I saw his car standing in front of the firm that does that kind of business referred to. How did he get his new position? I gave him no recommendation, neither did his new employer ask me for one. Perhaps he didn't need one. I was so informed the other day. There were several applicants for the job I had to offer. One of them, when asked for his recommendation, said: 'Aw, I don't use 'em—good men don't need 'em.'

"Too many owners know absolutely nothing about their car, and they rely entirely upon their chauffeur. His superior (?) knowledge over something with which they are unfamiliar, gives him a certain standing with the

owner, and he is rated as one of the 'best chauffeurs in New York'—until he is found out.

"It is the confidence which each owner has in his own chauffeur which surprises me. No matter if his experience with others has been unpleasant, his present man is always 'the best in New York.'

"I told a friend of mine the other day that he could use my car in case his was laid up during the week. He resented the idea of *his* car being laid up, because he had the 'best make' in the city. He has, however, been using my car for the opera and theater, because a dishonest chauffeur did lay his car up. I explained to him that I overheard his chauffeur telling another man that he wanted a few days' vacation, and was going to have the 'old man's' car 'taken down' in order to get a few days off. He has had several days off, but he has got another job, and I suppose when he wants another vacation he will lay *that* owner's car up.

"I know one automobile concern that is very unpopular in New York with chauffeurs. I am not advertising that concern, but you know who they are because I have one of their cars. They positively will not give commissions on the price of the work done on a car, the necessary work being caused by the carelessness or design of the chauffeur. Neither will they 'take down' a car unless it is absolutely necessary. So the chauffeurs prefer to knock this concern and 'root' for other manufacturers that will give them a commission, as well as a vacation.

"In case your man, for any reason best known to himself, does not care to take the car out of the garage and should telephone you that the rear axle is split, do not be satisfied that that is so when you visit the garage and find the rear wheels off. It takes only a minute or two to take them off and put them on again. Investigate his statement closely. Then, again, he may tell you that the car has a cracked cylinder, and that it will take some time to have it repaired. If you investigate all the excuses he gives you for not taking out your car, you will no longer have 'the best man in New York' in your employ—but you will be looking for him.

"The reliable chauffeur is also responsible for the other fellow. There are reliable chauffeurs, but you or I never get them, because they are never out of employment. Their employers keep them year after year. These chauffeurs know all that is going on about them in the garages, but as the other kind are in the majority, a decent chauffeur is afraid to show them up in their true colors.

"But the real trouble lies with the owners. Oh, I know I am one of them! A drunken joy ride of one of my former chauffeurs cost me a thousand dollars. I had liability insurance, but no car insurance; neither had I 'sympathy insurance'; so I paid \$250 in doctors' bills for the injured ones. This chauffeur is not in jail. His crying wife and children kept him out of it. I saw him standing at the Waldorf the other day. He is handling a high-powered car. I was tempted to tell his employer what I knew about him, but his wife and children had asked me not to, and his employer had asked me—nothing."

Treatment of Wheel Rims.

Another preventive of rust on wheel rims which is highly recommended, is to paint them with a mixture of shellac and finely pulverized flake graphite, mixed to a stiff paste. After treating the rims as indicated, it will be found that they are very even and a waterproof film of great smoothness is formed.

A frequent cause of overheating in modern cars, particularly on those cars where no pump is employed, is slipping of the fan belt.

Business News.

Exports of American cars during the month of November show no interruption of the increase noted in the preceding months. Fully five times as many cars were exported during this month as in November, 1908, the two quantities being 464 and 87, respectively.

The first product of the Parker Motor Co., Hartford, Conn.—a four-cylinder motor—has made its appearance on the market. It is of the 4-cycle, water cooled type, 4½ by 5 inches, developing 32.4 horsepower by A. L. A. M. rating.

The Connecticut Telephone & Electric Co., of Meriden, Conn., has filed a certificate of increase of capital stock from \$40,000 to \$250,000. The new money will be used in extending the business.

For years New York motorists have been compelled to take out and to display drivers' licenses at the pleasure of police and other inquisitive officers. On occasions they have been abused, and even fined, because they did not possess these seemingly important bits of paper. Now it appears that no drivers' license is necessary in the State of New York, except in the case of chauffeurs or hired drivers.

The American Locomotive Company have recently decided to spend half a million dollars in the expansion of their automobile manufacturing department, and to purchase at once new tools and machinery to the value of \$150,000.

A number of well known business men of northern Indiana have organized the Hoosier Automobile Company, of Garrett, and will establish a plant for the manufacture of gasoline cars in that city.

The Ford Motor Company, of Detroit, at the end of the year distributed the sum of \$79,502.87 among their employees, as a token of appreciation for faithful service rendered.

The North Star Auto Company is being organized at Stillwater, Minn., to engage in the manufacture of seven and five passenger touring cars and runabouts.

The Universal Motor Company, who recently completed their first motor truck, are planning to erect a factory for its construction in Denver, Col.

The Sebring Motor Car Company, of Sebring, Ohio, recently completed their first car, a six-cylinder, 35-40 horsepower.

Business men of Seymour, Wis., have organized a stock company for the manufacture of automobiles.

Coming Exhibitions.

Jan. 17-22.—Philadelphia, Second Regiment Armory, Automobile Show. J. H. Beck, Secretary, 216 Odd Fellows' Building.

Jan. 17-22.—Kansas City, Mo., Annual Automobile Show of the Motor Car Trade Association of Kansas City. P. S. Sutermeister, Secretary, Midland Building.

Jan. 24-29.—Detroit, Wayne Hotel Gardens, Third Annual Automobile Show, Detroit Auto Dealers' Association. John Gillispie, Manager, Hotel Tuller.

Jan. 24-31.—Washington, D. C., Convention Hall, Automobile and Aeronautical Show, Automobile Dealers of Washington. B. R. Johnson, Manager, 1313 New York Avenue, N. W.

Feb. 5-12.—Chicago, Coliseum, Ninth Annual Automobile Show, National Association of Automobile Manufacturers. S. A. Miles, General Manager.

Feb. 14-19.—Buffalo, N. Y., Broadway Arsenal, Eighth Annual Automobile Show, Automobile Club of Buffalo. Dai H. Lewis, Manager, 760 Main Street.

Feb. 19-26.—Newark, N. J., Essex Troop Armory, Automobile Show, New Jersey Exhibition Company.

Feb. 19-26.—Salt Lake City Auditorium, Automobile

Show, Utah Automobile Dealers' Association. W. D. Rishel, Manager, 1-5 East First South Street.

Feb. 21-26.—Cincinnati, Music Hall, Automobile Show, Automobile Club of Cincinnati. Jesse Lippencott, Chairman Exhibits Committee, Gibson House.

Feb. 22-27.—Milwaukee, Wis., Auditorium, Second Annual Automobile Show, Milwaukee Automobile Club.

Feb. 24-26.—Binghamton, N. Y., State Armory, Automobile Show. R. W. Whipple, Secretary.

Feb. 24-Mar. 3.—Toronto, St. Lawrence Arena, Canadian Automobile Show, Ontario Motor League. E. M. Wilcox, Secretary.

March 5-12.—Boston, Mechanics' Building, Eighth Annual Automobile Show, Boston Automobile Dealers' Association. Chester I. Campbell, General Manager, 5 Park Square.

March 12-19.—Syracuse, N. Y., State Armory, Automobile Show, Syracuse Automobile Dealers' Association.

March 21-30.—Buffalo, N. Y., Convention Hall, Third Annual Power Boat and Sportsmen's Show, Buffalo, Launch Club. D. H. Lewis, Manager, 760 Main Street.

March 26-April 2.—Pittsburg, Pa., Duquesne Garden, Fourth Annual Show, Automobile Dealers of Pittsburg. Frank D. Sauppe, Chairman.

Some Improvements Needed.

Although there have been wonderful improvements in the automobile during the past five years and substantial betterments in some cases in the car of 1910 over that of 1909, there is room for still further advance. There is room for improvement in pumping the tires. Of course the engine should do this simply and easily, but yet air bottles and hand pumps are the rule and not the exception. Makers have also much to learn about lamps and wind shields; and carburation, both from a power-productive and an economical point of view, needs improvement. In bodywork, the changes that have been made by various manufacturers since the inception of the car, indicate that there is still much experimenting going on. In the construction, arrangement, and height of seats one notices changes from year to year. In an open body there are advantages in seats which are only raised eight or ten inches above the floor. The body is lower; the center of gravity lower, and the area against which the air offers resistance is less than it is with the car having higher seats. But a low seat demands increased leg room, and a more sloped and lengthened steering post. In a very low seat, the weight of the upper part of the body is thrown back too much. In a high seat much of the thigh weight is borne by the feet, and the legs will at times relieve the pelvis of the thrust of a jolt. So it would appear that a very low seat is more tiring than a higher seat and a medium is called for.

Tubing for Acetylene Gas.

Few car manufacturers or lamp makers supply tubing that is really satisfactory for conveying gas from separate generators to the headlights. As a rule the lightest rubber "babies' bottle" tubing is thought adequate, and in use it perishes very quickly. We have seen cars to which careful owners have fitted copper piping secured to the chassis, and completed by short lengths of rubber at the four unions. We can personally recommend very best thick rubber tubing, which is costly in the first instance but cheap in the long run, or the metal-wound tubing supplied by coal gas companies for use with their latest "inverted mantle" incandescent reading lamps. It is doubtful whether copper tubing is safe, owing to chemical action, and either of the above substitutes is exceedingly durable, and can be neatly run along the members of the chassis by bindings of ordinary insulating tape.



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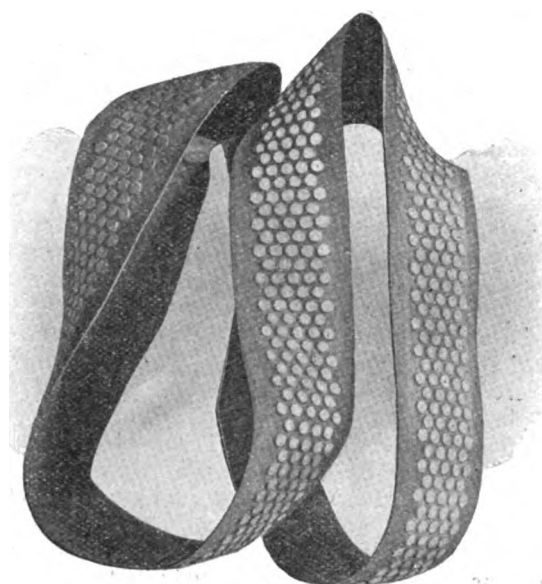
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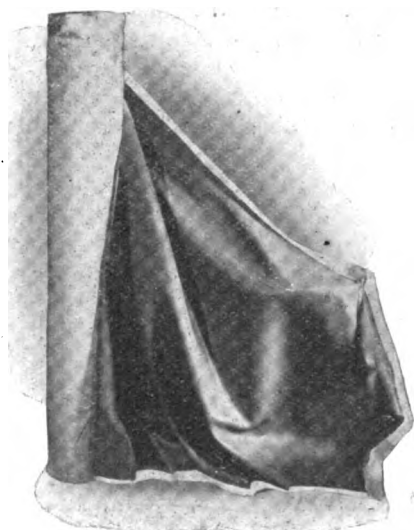
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THE WATER CIRCULATION.

How an Air Pocket Made the Car Run Badly.

"We were afflicted with an instructive experience a few days ago," says a writer in a European publication. "Up to the luncheon stop the car had run perfectly, but immediately upon the restart from the hotel it commenced to run badly and presently the engine began to knock, a stop becoming imperative. Troubles often occur soon after a stoppage by mere coincidence, but it was decided to begin by ignoring coincidence in the preliminary diagnosis. Fortunately the sole attention the car had received was the filling up of the water tank, and this restricted the first field of inquiry. The driver luckily remembered that he had added about a gallon of water to the radiator with the engine stopped, and that when he took off the filler cap he had been able to notice that the level of the water was below the exposed ends of the vertical tubes. Hence he suspected an airlock in the water circulation, and consequently overheating. This was confirmed by the fact that that tank was cold, while the engine jackets were excessively hot. A drain tap was opened at the bottom of the pump, the filler cap removed, and the engine started. In a minute or two the tank began to warm, so both orifices were closed, and the lost water was replaced by a gallon or so brought from a neighboring brook.

"Water should always be added to the radiator before the level has sunk low enough to expose the tops of any of the tubes; if the level be lower than this, the incoming water imprisons a pocket of air in one or other of the many narrow tubes in the system. One would expect the rush of water from the pump to force this pocket of air up into the space above the tubes in the radiator, but in practice it often fails to do so. If replenishment be neglected until the tops of the tubes are uncovered, the safest plan is to open a drain tap placed at the lowest point of the circuit, and to continue pouring until a constant stream of water emerges from the tap, proving that the circulation is clear. It is also fairly safe to start up the engine, and trickle in the fresh water in a thin stream until there are evidences of a through circulation."

Mysterious Misfiring.

Misfiring has often been found to be due to the insulation of a low tension wire being damaged by a clip or other fastening. One of the best plans in all these cases is to take a fresh piece of insulated wire, or even ordinary wire, and skip the regular circuit. This will generally show where the fault lies.

Some cars have very faulty return at the commutator, as for instance, when under the footboard. If a car come

in for misfiring the first thing a smart repairer would do would be to clean a place on the shaft driving the commutator, and put a temporary metal brush rubbing on this clean place, and fasten to the frame with a hand vice. This almost always cured the missing. Of course, to make a permanent repair a more correct return could easily be devised, but the chief point is to find out exactly where the fault lies.

Cleaning the Cylinders.

Here is a suggestion for cleaning carbon deposits in cylinders which will probably answer if thoroughly applied: The device employed is a common housekeeper's metallic wash rag, made of a series of wire rings interlocking with one another. The kind preferred is that in which the rings are composed of two coils of wire, one coil overlapping the joint. Another kind, not so good, is that which has no wire overlapping the joint, and can, with little effort, be pulled apart. One of these metallic articles dropped into a cylinder and the other three cylinders made to run about 10 minutes, completely removes the carbon.

For Rust Spots.

To remove rust spots from nicked surfaces, grease the rusty part well, allowing the grease to remain for some hours, then rub with a rag dipped into ammonia. This treatment will do away with most rust spots, but if any of these are difficult to remove, they should be carefully dampened with a little diluted hydrochloric acid and quickly wiped dry. The surfaces so treated should be washed with clean water, and when dry, rubbed with polishing powder.

Loss of Power.

After a good deal of use the engine power may be noticed to fall off mysteriously. When a careful overhauling of the ignition, carburetter, etc., fails to reveal any reason for it, it is worth while to examine the muffler to see if the exhaust gases have a free exit.

"Next year will be the greatest year for aeronautics in this country with two international races and one national race held under the auspices of the Aero Club of America. There will be aviation contests in all the large cities and an era of the air is coming which will supplement with amazing efficiency the wonderful imprint made by the automobile on the development of transportation methods throughout the world."

THE CHICAGO SHOW

List of Exhibitors at the Coliseum for the Week of February 5-12.

COLISEUM—MAIN FLOOR.

American Locomotive Co., New York.
Apperson Brothers Auto Co., Kokomo, Ind.
Babcock Electric Carriage Co., Buffalo, N. Y.
Baker Motor Vehicle Co., Cleveland, O.
Bartholomew Co., Peoria, Ill.
Buick Motor Co., Flint, Mich.
Cadillac Motor Car Co., Detroit, Mich.
Chalmers-Detroit Motor Co., Detroit, Mich.
Columbia Motor Car Co., Hartford, Conn.
Corbin Motor Vehicle Corp., New Britain, Conn.
Dayton Motor Car Co., Dayton, O.

Elmore Mfg. Co., Clyde, O.
Everitt - Metzger - Flanders Co., Detroit, Mich.
Franklin, H. H., Mfg. Co., Syracuse, N. Y.
Haynes Automobile Co., Kokomo, Ind.
Hudson Motor Car Co., Detroit, Mich.
Jeffrey, T. B., & Co., Kenosha, Wis.
Knox Automobile Co., Springfield, Mass.
Locomobile Co. of America, Bridgeport, Conn.
Lozier Motor Co., New York.
Maxwell-Briscoe Motor Co., Tarrytown, N. Y.
Matheson Motor Car Co., Wilkes-Barre, Pa.

Metzger Motor Car Co., Detroit, Mich.
Midland Motor Co., Moline, Ill.
Mitchell Motor Car Co., Racine, Wis.
National Motor Vehicle Co., Indianapolis, Ind.
Nordyke & Marmon Co., Indianapolis, Ind.
Oakland Motor Car Co., Pontiac, Mich.
Olds Motor Works, Detroit, Mich.
Packard Motor Car Co., Detroit, Mich.
Peerless Motor Car Co., Cleveland, O.
Pennsylvania Auto-Motor Co., Bryn Mawr, Pa.
Pierce-Arrow Motor Car Co., Buffalo, N. Y.
Pope Mfg. Co., Hartford, Conn.

Premier Motor Mfg. Co., Indianapolis, Ind.
 Reo Motor Car Co., Lansing, Mich.
 Ricketts Auto Works, South Bend, Ind.
 Royal Tourist Car Co., Cleveland, O.
 Selden Motor Vehicle Co., Rochester, N. Y.
 Stearns, F. B., Co., Cleveland, O.
 Stevens-Duryea Co., Chicopee Falls, Mass.
 Studebaker Automobile Co., South Bend, Ind.
 Thomas, E. R., Motor Co., Buffalo, N. Y.
 Waverley Co., Indianapolis, Ind.
 Winton Motor Carriage Co., Cleveland, O.
 White Co., Cleveland, O.
 Woods Motor Vehicle Co., Chicago.

**FIRST REGIMENT ARMORY—
MAIN FLOOR.**

American Motor Car Co., Indianapolis, Ind.
 Atlas Motor Car Co., Springfield, Mass.
 Auburn Automobile Co., Auburn, Ind.
 Austin Automobile Co., Grand Rapids, Mich.
 Berliet Import Co., Chicago, Ill.
 Brush Runabout Co., Detroit, Mich.
 Buckeye Mfg. Co., Anderson, Ind.
 Cartercar Co., Pontiac, Mich.
 Chadwick Engineering Works, Pottstown, Pa.
 Dorris Motor Car Co., St. Louis, Mo.
 Fiat Automobile Co., New York.
 Gaeth Automobile Co., Cleveland, O.
 Holsman Automobile Co., Chicago, Ill.
 Hupp Motor Car Co., Detroit, Mich.
 Jackson Automobile Co., Jackson, Mich.
 Kimball, C. P., & Co., Chicago, Ill.
 McIntyre, W. H., Co., Auburn, Ind.
 Moline Automobile Co., East Moline, Ill.
 Moon Motor Car Co., St. Louis, Mo.
 Mora Motor Car Co., Newark, N. Y.
 Ohio Motor Car Co., South Cincinnati, O.
 Palais de l'Automobile, New York.
 Rapid Motor Vehicle Co., Pontiac, Mich.
 Rauch & Lang Carriage Co., Cleveland, O.
 Regal Motor Car Co., Detroit, Mich.
 Renault Freres Selling Branch, Inc., New York.
 Simplex Motor Car Co., Mishawaka, Ind.
 Speedwell Motor Car Co., Dayton, O.
 Staver Carriage Co., Chicago, Ill.
 Willys-Overland Co., Toledo, O.
 York Motor Car Co., York, Pa.

COLISEUM—BASEMENT.

Anderson Carriage Co., Detroit, Mich.
 Black Mfg. Co., Chicago, Ill.
 Cameron Car Co., Beverly, Mass.
 Elkhart Motor Car Co., Elkhart, Ind.
 Fal Motor Co., Chicago, Ill.
 Fuller Buggy Co., Jackson, Mich.
 Grabowsky Power Wagon Co., Detroit, Mich.
 Great Western Auto Co., Peru, Ind.
 Inter-State Automobile Co., Muncie, Ind.
 Kissel Motor Car Co., Hartford, Wis.
 Lion Motor Car Co., Adrian, Mich.
 Rider-Lewis Motor Car Co., Anderson, Ind.
 Schacht Mfg. Co., Cincinnati, O.
 Streater Motor Car Co., Streater, Ill.
 Wayne Works, Richmond, Ind.
 Zimmerman Mfg. Co., Auburn, Ind.

COLISEUM GALLERY AND ANNEX.

Ajax-Grieb Rubber Co., New York.
 American Electric Novelty & Mfg. Co., New York.
 Atwater Kent Mfg. Works, Philadelphia, Pa.
 Aurora Automatic Machinery Co., Aurora, Ill.
 Auto Improvement Co., New York.
 Auto Parts Mfg. Co., Muncie, Ind.
 Badger Brass Mfg. Co., Kenosha, Wis.
 Baldwin Chain & Mfg. Co., Worcester, Mass.
 Batavia Rubber Co., Batavia, N. Y.
 Bowser, S. F., & Co., Fort Wayne, Ind.
 Breeze Carburetor Co., Newark, N. J.
 Briggs & Stratton, Milwaukee, Wis.
 Brown-Lipe Gear Co., Syracuse, N. Y.

Byrne-Kingston & Co., Kokomo, Ind.
 Connecticut Telephone & Electric Co., Meriden, Conn.
 Continental Caoutchouc Co., New York.
 Continental Motor Mfg. Co., Muskegon, Mich.
 Consolidated Rubber Tire Co., New York.
 Cook, Adam, Sons, New York.
 Cook's Standard Tool Co., Kalamazoo, Mich.
 Cowles, C., & Co., New Haven, Conn.
 Cramp & Sons Co., Philadelphia, Pa.
 Dayton Rubber Mfg. Co., Dayton, O.
 Diamond Chain & Mfg. Co., Indianapolis, Ind.
 Diamond Rubber Co., Akron, O.
 Dietz, R. E., Co., New York.
 Dixon, Joseph, Crucible Co., Jersey City, N. J.
 Duff Mfg. Co., Pittsburg, Pa.
 Edmunds & Jones Mfg. Co., Detroit, Mich.
 Electric Storage Battery Co., Philadelphia, Pa.
 Empire Tire Co., Trenton, N. J.
 Excelsior Motor & Mfg. Co., Chicago, Ill.
 Federal Rubber Co., Trenton, N. J.
 Firestone Tire & Rubber Co., Akron, O.
 Fisk Rubber Co., Chicopee Falls, Mass.
 Fox Metallic Tire Belt Co., 15 Murray St., New York.
 Gabriel Horn Mfg. Co., Cleveland, O.
 G. & J. Tire Co., Indianapolis, Ind.
 Gemmer Mfg. Co., Detroit, Mich.
 Gilbert Mfg. Co., New Haven, Conn.
 Globe Machine & Stamping Co., Cleveland, Ohio.
 Goodrich, B. F., Co., Akron, O.
 Goodyear Tire & Rubber Co., Akron, O.
 Gray & Davis, Amesbury, Mass.
 Ham, C. T., Mfg. Co., Rochester, N. Y.
 Hancock Mfg. Co., Charlotte, Mich.
 Hardy, R. E., Co., New York.
 Harris, A. W., Oil Co., Providence, R. I.
 Hartford Rubber Works Co., Hartford, Conn.
 Hartford Suspension Co., Jersey City, N. J.
 Havoline Oil Co., New York.
 Hayes Mfg. Co., Detroit, Mich.
 Heinze Electric Co., Lowell, Mass.
 Herz & Co., New York.
 Hoffecker Co., Boston, Mass.
 Holley Brothers Co., Detroit, Mich.
 Imperial Brass Mfg. Co., Chicago, Ill.
 Jones Speedometer Co., New York.
 Kokomo Electric Co., Kokomo, Ind.
 Leather Tire Goods Co., Newton Upper Falls, Mass.
 Link-Belt Co., Philadelphia, Pa.
 Long Mfg. Co., Chicago, Ill.
 Lovell-McConnell Mfg. Co., Newark, N. J.
 McCord Mfg. Co., Detroit, Mich.
 Mezger, C. A., New York.
 Michelin Tire Co., Milltown, N. J.
 Morgan & Wright, Detroit, Mich.
 Mosler, A. R., & Co., New York.
 Motsinger Device Mfg. Co., Pendleton, Ind.
 Motz Clincher Tire Co., Akron, O.
 Muncie Gear Works, Muncie, Ind.
 National Carbon Co., Cleveland, O.
 National Coil Co., Lansing, Mich.
 Never-Miss Spark Plug Co., Lansing, Mich.
 Norton Co., Worcester, Mass.
 N. Y. & N. J. Lubricants Co., New York.
 Oliver Mfg. Co., Chicago, Ill.
 Pantasote Co., New York.
 Pennsylvania Rubber Co., Jeannette, Pa.
 Randall-Faichney Co., Boston, Mass.
 Rand Mfg. Co., Detroit, Mich.
 Remy Electric Co., Anderson, Ind.
 Republic Rubber Co., Youngstown, O.
 Ross Gear & Tool Co., Lafayette, Ind.
 Royal Equipment Co., Bridgeport, Conn.
 Sager, J. H., Rochester, N. Y.
 Shaler, C. A., Co., Waupun, Wis.
 Smith, A. O., Co., Milwaukee, Wis.
 Spicer Universal Joint Mfg. Co., Plainfield, N. J.
 Splittorf, C. F., New York.
 Sprague Umbrella Co., Norwalk, O.
 Standard Welding Co., Cleveland, O.

Standard Roller Bearing Co., Philadelphia, Pa.
 Stewart & Clark Mfg. Co., Chicago, Ill.
 Stromberg Motor Devices Mfg. Co., Chicago, Ill.
 Swinehart Clincher Tire Co., Akron, O.
 Thermoid Rubber Co., Trenton, N. J.
 Timken-Detroit Axle Co., Detroit, Mich.
 Timken Roller Bearing Co., Canton, O.
 United Manufacturers.
 U. S. Light & Heating Co., 30 Church St., New York.
 Valentine & Co., New York.
 Veeder Mfg. Co., Hartford, Conn.
 Vesta Accumulator Co., Chicago, Ill.
 Warner Gear Co., Muncie, Ind.
 Warner Instrument Co., Beloit, Wis.
 Weed Chain Tire Grip Co., New York.
 Warner Mfg. Co., Toledo, O.
 Wheeler & Schebler, Indianapolis, Ind.
 Whiteley Steel Co., Muncie, Ind.
 Whitney Mfg. Co., Hartford, Conn.
 Witherbee Igniter Co., New York.

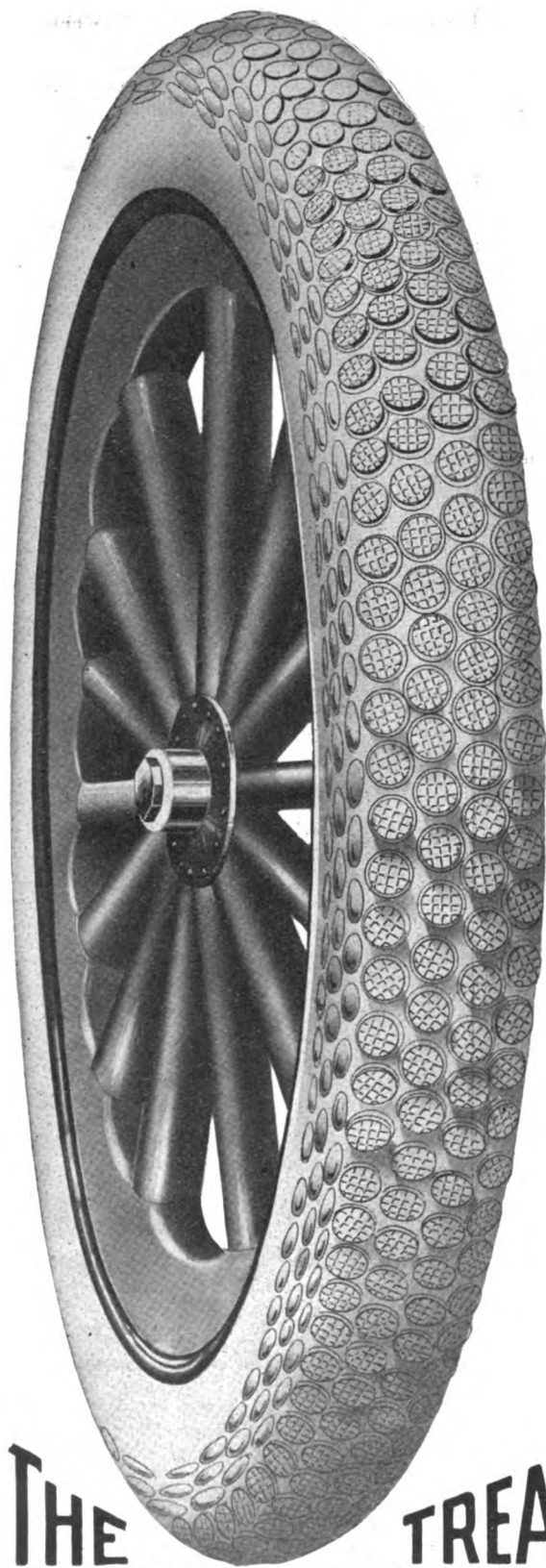
**COLISEUM GALLERY AND ANNEX—
SECOND FLOOR.**

American Motor Co., Brockton, Mass.
 Consolidated Mfg. Co., Toledo, O.
 Excelsior Supply Co., Chicago, Ill.
 Greyhound Motor Works, Buffalo, N. Y.
 Harley-Davidson Motor Co., Milwaukee, Wis.
 Hendee Mfg. Co., Springfield, Mass.
 Hornecker Motor Mfg. Co., Geneseo, Ill.
 Merkel Light Motor Co., Pottstown, Pa.
 New Era Gas Engine Co., Dayton, O.
 Pierce Cycle Co., Buffalo, N. Y.
 Reading Standard Co., Reading, Pa.
 Reliance Motor Cycle Co., Oswego, N. Y.

**FIRST REGIMENT ARMORY—
GALLERY.**

Apple Electric Co., Dayton, O.
 Benford, E. M., Mount Vernon, N. Y.
 Breakstone, S., Chicago.
 Chicago Wind Shield Co., Chicago, Ill.
 Chilton Printing Co., Philadelphia, Pa.
 Detroit Motor Car Supply Co., Detroit, Mich.
 Driggs-Seabury Ordinance Corp., Detroit, Pa.
 Elite Mfg. Co., Ashland, O.
 Excelsior Supply Co., Chicago, Ill.
 Fellwock Auto & Mfg. Co., Evansville, Ind.
 Flentje, Ernst, Cambridge, Mass.
 Franklin, H. H., Mfg. Co., Syracuse, N. Y.
 Fulton-Zinke Co., Chicago, Ill.
 Garage Equipment Co., Milwaukee, Wis.
 Gasoline Motor Efficiency Co., Jersey City, N. J.
 Gates-Osborn Mfg. Co., Marshalltown, Ia.
 High Frequency Ignition Co., Los Angeles, Cal.
 Lavalette & Co., New York.
 Mesinger, H. & F., Mfg. Co., New York.
 Morrison-Ricker Mfg. Co., Grinnell, Ia.
 Motor Parts Co., Plainfield, N. J.
 Motor Specialty Co., Detroit, Mich.
 Overland Sales Co., Chicago, Ill.
 Perfection Spring Co., Cleveland, O.
 Simms Magneto Co., New York.
 Smith, Fred W., Aberdeen, S. D.
 Standard Auto Supply Co., Chicago, Ill.
 Standard Varnish Works, Chicago, Ill.
 Triple Action Spring Co., Chicago, Ill.
 Troy Carriage Sunshade Co., Troy, O.
 20th Century Motor Car Supply Co., South Bend, Ind.
 Universal Tire Protector Co., Angola, Ind.
 Vanguard Mfg. Co., Joliet, Ill.
 Vehicle Top & Supply Co., St. Louis, Mo.

AUTOMOBILE ENGINEERING.—The American School of Correspondence, Chicago, Ill., have a half-page announcement in this issue of their Cyclopaedia of Automobile Engineering. Four big volumes, 1700 pages and 1500 illustrations. But consult their announcement and send for particulars, using coupon attached.



Bricton Lay A Sure In Day By Day Endurance Only Incidental

Don't Misunderstand Us!

On any "Touring" or "Endurance Run" on the boards—you play safe by equipping your tires with Bricton Detachable Treads.

Just as they make for safe—sure—and better motoring under day by day performance—cut down tire bills—do away with punctures—blowouts and skidding.

So—they make for nearly ideal running of any car in any contest.

There was no better example of this assertion and its truth as exemplified in actual performance than that given by the record of Bricton Detachable Treads on the "Little Glidden Tour."

This was a run from Fargo, N. D., to St. Paul, Minn., August 27, 1909.

In this tour as in all endurance contests, the main trouble could be traced to tire break-downs.

Those tires unprotected, seemed to be subjected to one continual Bang—Bang—Bang of punctures and blowouts.

Added to these were numerous records of dangerous and expensive skidding.

Without mention of names, let us see something of the record of tire accidents.

The start was made at 8:30 A.M., morning of August 27th.

The first blowout came four miles out, the next three miles from Anoka.

Then another a mile from Becker, still another seven miles further on.

Just before reaching St. Cloud, one car skidded in taking the corner, knocking off the rear wheel,—and so on.

One continual round of punctures, blowouts and skidding. One would really think that touring was of necessity a hazardous undertaking.

So hazardous as to be under danger of a ban from life insurance companies.

But let us consider the other side of the tour. It extended 565 miles over broken country. Over roads that ranged from sticky and miry clay, often wet two inches down, to those whose composition was loose gravel. Then the country was very hilly.

Under all these conditions one car came through with tires unscathed, and that car was equipped with Bricton Detachable Treads.

You realize—Mr. Motorist—that protection under such conditions is protection of worth the while kind.

It is a protection you can well afford to secure for your own tires.

That is the protection that combined to make a real record for our Chalmers Detroit car, equipped with Bricton Detachable Treads, illustration which we herewith show.

Hear under these conditions—

FOLLOW THE ARROW SEND COUPON

THE TREAD

BRICTON MANUFACTURING CO.,

Box A. D. 01,

Brookings, South Dakota.

Send all information, prices, propositions and booklet about Bricton Detachable Treads.

Name.....

Address.....

Size of Tires.....

Please mention the Automobile Dealer and Repairer when writing to advertisers.

Detachable Treads Foundation For Success Performance. Contests Are

The Tread—The Test—The Testimonial.

Demonstrated conclusively that Bricton Detachable Treads match up to every condition that motor-ing may encounter.

In the "Little Glidden Tour" we entered a stock ar.

We equipped the tires with Bricton Treads.

The car came through with the tires uninjured—ree from blowouts and punctures. And as the records show covered the 565 8/10 miles in better time than any other entry.

The exact time of running was 25 hours and 5 minutes.

Herewith we reproduce the signed statement of Dr. W. H. Card, Sec'y and Treas., Minnesota State Automobile Association.

Dr. Card made a personal inspection of our tires at the end of this tour.

Then note the illustration of the car itself—The tires as they appear covered with Bricton Treads.

Do they look clumsy?

Do they detract one iota from the neat appearance of the car? No.

They will look no different on your car.

They are made to fit snugly on your tires.

They will cause more dollars—than you perhaps realize—to fit snugly to your pocketbook.

In place of punctures, blowouts and skidding, in place of sure monthly tire repair bills, you will have better motoring and at a less expense.

Bricton Treads cost only about half of new tires. They outwear from three to six.

Figure it—quick. They save you money and give satisfaction.

Fill out the coupon right now. Ask for our late booklet—"The Enemy of Tire Expense."

Please give the size of your tires.

You will secure the booklet and our SPECIAL OFFER to Introduce Bricton Detachable Treads.

Don't lay down without filling out the coupon—tearing it out and sending it to

THE BRICTON MANUFACTURING COMPANY

Box A. D. 01, BROOKINGS, S. D., U. S. A.

To Dealers: You are passing a genuine money making addition to your supply line when you overlook Bricton Detachable Treads for 1910. Ask to-day for our DEALERS' PROPOSITION.

Minnesota State Automobile Association
American Automobile Association
SECRETARY'S OFFICE 204 POLARIS BUILDING

Minneapolis Minn. Sept. 2nd, 1909

Bricton Manufacturing Co.,

Brookings,

South Dakota.

Dear Sirs:

Replying to your query of September 1st as to the showing made by your tire treads on the "Chalmers Thirty" entered by you in the recent "Little Glidden" tour given by the Minnesota State Automobile Association, from Minneapolis to Fargo and return, wish to say that I visited the Barclay garage yesterday P. M. and made a careful examination of the treads and found them in remarkably fine condition and showing little or no wear after nearly six hundred miles of running over good, bad and indifferent roads, and this in addition to the 250 miles which I understand you made in the car from Brookings to St. Paul to enter the tour. The fact of your having a perfect tire score and the apparent "trouble proof" construction of your treads, together with the condition of the treads after such a test, has decided me to equip my Cadillac Thirty with your treads on the rear wheels. My tires are 32x4 inch, Empire clincher. Please ship by express

Very truly yours,

W. H. Card

THE TESTIMONY



THE TEST

SURE TODAY

Please mention the Automobile Dealer and Repairer when writing to advertisers.

THE "TWINGRIP" WRENCH.

This is a multiple wrench as shown in the cut, and is really seven wrenches and a screw driver combined including an alligator wrench, and is an extremely useful tool for roadside repairs, adjustments, etc. This wrench is offered to our readers at the extremely low price of \$1. The manufacturers are the Burkley Supply Co., 25 Old Slip, New York City. One of these wrenches will be sent promptly to any reader who will mention this publication and enclose the remittance of \$1 in his



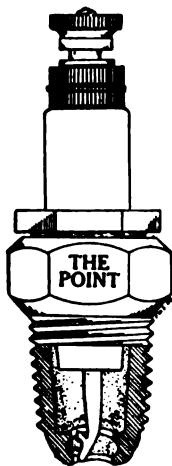
Seven wrenches and a screwdriver.

letter. This wrench was invented by Walter H. Perram, who is well known in automobile circles as a clever inventor and mechanic.

GRIP-ON BRAKE BAND LINING.—This is described as an unique and economical discovery. It is a brake band lining for automobiles that the manufacturers say will not disintegrate or become hard, will wear uniformly and has a special reinforcement that takes up sudden jars and strains and saves the body of the lining. Interested readers should write for circular and prices to the New York Leather Belting Co., 44 Franklin street, Chicago, Ill., or 51 Beekman street, New York City, not forgetting to mention this paper.

THE POINT SPARK PLUG.

This plug is described by the manufacturers as a necessity on all engines that use large quantities of lubricating oil, such as small, rapid engines, air-cooled automobiles and motor cycles. These plugs are put out with a very strong guarantee and any defective plug will be replaced if returned to the manufacturer. Any broken



A Perfect Spark Plug.

spark plug returned to the manufacturer with five cents will be repaired and returned. These plugs are manufactured by the Point Spark Plug Co., Aberdeen, S. D., who will have an exhibit in the Chicago Show at space No. 13. Readers are requested to call on them during the show, or write for descriptive circular and prices, not forgetting to mention this paper.

THE Duff Mfg. Company, of Pittsburg, Pa., makers of Barrett Jacks had a very comprehensive exhibit of lifting equipment at the automobile show in the Grand Central Palace, this city. This exhibit in-

cluded not only automobile trucks, but a complete line of types of varying capacities, as well as the heavier lifting jacks for handling heavy trucks and motors, machinery and other heavy material in automobile factories. The Barrett "Junior" Jack weighing only five pounds but having a lifting capacity of 1500 pounds dead weight, was of course of particular interest to motorists.

THE Empire Tire Company of Trenton, N. J., has sent us a very neat little booklet of thirty-two pages, containing numer-

ous illustrations of the tires which they manufacture, as well as brake liners, ignition cable, tube patches, etc. This company also manufactures a very effective tire protector and a repair pad. One of these booklets will be sent to any one writing for it and mentioning this journal.

THE "Ohio" Ratchet Jack has recently been brought out by the Elite Manufacturing Company of Ashland, Ohio. It is made in two sizes and is said to contain about half the number of pieces usually found in the ordinary ratchet jack. The bar can be dropped instantly after the load has been released, and has two inches more adjustment than ordinary jacks. The handles can be used as a tire tool at one end and a hammer at the other.

The "Reliable Tire Saver," manufactured by this company is well worth considering by all automobile owners. It is made with a swivel top and leather-faced saddle, and can be adjusted to any height, hub or axle. It takes up comparatively little room and if properly used will prolong the life of the tire about one-third, by relieving the tire of its weight and keeping it off the damp, cold and oily floors.

THE Firestone Tire and Rubber Co., have brought out a little booklet which briefly describes the Firestone Non-skid Tire. They say that as high as 10,000 miles service with these tires is reported by users. We believe one of these booklets will be sent to any reader who may be interested.

THE Remy Electric Company of Anderson, Ind., has opened a branch distributing office at 170 Golden Gate avenue, San Francisco, Cal., where a complete line of magnetos, fittings and parts will be carried in stock. The Remy line for 1910 consists of two standard types. Type "T" has been developed for use on two-cylinder and four-cylinder cars, having a small motor. It has four magnets in two pairs and is a compactly built machine. Type "S" is for large motors and is suitable for two, four or six-cylinder cars. This machine has six magnets in three pairs. The Remy Magneto is equipped with a special non-vibrating coil, upon which is mounted a switch, permitting of batteries being used for starting purposes or for emergencies.

A MARVELOUS TARNISH PREVENTIVE.—F. H. Schmoeger, Sterling, Ill., manufactures a preparation to prevent brass and other metal from tarnishing, which he calls "Stay Shiny." It can be used on automobile lamps, and everything else about an automobile that is liable to tarnish. Garage owners and dealers who are agents for this preparation, we are told are making big money out of it. Our readers who own cars will doubtless be interested. See their advertisement on another page, and in

writing for further particulars, kindly mention this publication.

MENDENHALL'S ROAD MAPS.—C. S. Mendenhall, 512 Race street, Cincinnati, Ohio, has brought out his price list of maps and guides for automobilists for 1910, and a copy, we understand will be sent to every reader of this paper who may be interested. Mr. Mendenhall has the best list of maps, that we are acquainted with.

THE AMERICAN AUTO MOTOR LOCKING DEVICE.—This is a clever device recently invented for locking the automobile starting crank, so that it is impossible for any person without a key to start the car in motion. The invention is extremely simple, inexpensive and effective. Any car owner who will put one of these locking devices on his car is in a position to prevent the use of his car by unauthorized persons, and if he wishes to leave the car standing empty at the side of the street, it is impossible with this lock in use for any thief to take possession. Good agents are wanted for this device throughout the country, and our readers are requested to send for circulars, prices and full particulars to the American Auto Motor Locking Device Co., 141-143 Stockholm street, Brooklyn, N. Y. In writing mention this paper.

COLUMBIA LOCK NUTS.—There is always danger of an ordinary nut on an automobile working loose and causing an accident. It is a good deal of trouble to look all over a car every once in a while to see if there are any loose nuts. All this can be avoided by seeing to it that your automobile is provided with the Columbia Lock Nuts. They will not shake loose under any circumstances. But write to the Columbia Bolt and Nut Co., Bridgeport, Conn., for their little booklet entitled "Green and Yellow" and it will tell you all about their nuts. Mention THE AUTOMOBILE DEALER AND REPAIRER.

CHAMPION SPARK PLUG OFFER.

We illustrate the Champion Magneto Special Spark Plug manufactured by the Champion Co., 37 Whittier St., Boston, Mass. This plug has a heavy bar electrode,



The Champion Magneto Special Spark Plug.

which cannot burn or warp. It gives the "splash spark" so effective on a magneto. The positive setting of points cannot change under heat of cylinder. This and five other styles of spark plugs made by this same company are offered at half price to our readers in limited quantity in the attractive half-page announcement printed elsewhere this month. This offer is only held open for thirty days. Readers should take immediate advantage of this offer. Send remittances to the Champion Company of Boston, and mention this journal.

GOODRICH TIRES.—The B. F. Goodrich Co., of Akron, Ohio, is displaying on the billboards of this city a very effective poster in colors.

A PORTABLE CRANE AND HOIST.

The manufacturers of the portable floor crane and hoist say it was at first made for their own use, but after having been perfected it was put on the market to supply a decided need. This tool is inde-



Floor Crane and Hoist.

structible. It is not bent up in its making. It cannot be bent in use. It is cast from the stiffest iron made and for strength it is bound by a heavy steel band, which sustains all the load and the heavier the load the firmer the band is bound to the stiff casting, thereby making it better by usage up to its capacity instead of worse. An

automobile repairer not only wants something that will pay for itself the first year but that which will last practically forever, that which cannot be made better. The cost is small, though it is better by far to buy something in which you have your full money's worth in actual material value and one that is made up completely in one factory even if it does cost more than the common-place articles which are only temporary at best. This tool will lift ten times as much as your average usage, but it should not be selected by the number of pounds it lifts, but by its height, because an average lathe bed or automobile frame is 4 ft. high and you want a tool that will comfortably lift out your engine and convey it to any part of your repair shop into a lathe and back again and something that will lift up the entire automobile at either end or at both ends by having two cranes high enough in the air to do you some good and therefore, the 7 ft. 6 in. or the No. 3 size is the most useful and the one used by most of the Motor Car Companies. For price and full information, address the Canton Foundry & Machine Co., Canton, O.

A HANDY VULCANIZER—The Garage Equipment Co., of Milwaukee, Wis., is putting on the market a new combination vise and vulcanizer which has many points of decided merit and novelty. It consists of a vise, a smooth plate on which to lay a tube while preparing a patch, a hot plate having one flat surface for inner tubes, and a concave surface for outer casings, and a yoke to clamp the hot plate to the casing. The heat, which is obtained by burning gas from the gas tank or carbide-generator, is evenly distributed to all parts of the hot plate. The temperature is clearly indicated by a thoroughly protected thermometer, which can easily be read. The

opening and closing of a small gas cock enables one to control the heat perfectly at any desired temperature. This positively assures you against burning tubes and casings or bursting thermometers. Time required to bring the cold instrument to the required temperature is about 5 minutes. No knowledge of vulcanizing required to use it, and it is compact and weighs less than 9 pounds complete. This tool is strictly guaranteed by the manufacturers in material, workmanship and to do work in a perfectly satisfactory manner. The instrument comprising the vise, hot plate, a quantity of vulcanizing cement, a supply of the best Para rubber and tubing, with which to connect to gas tank, are packed in a small, strong box with full directions for using. For price and any other information, address the Garage Equipment Co., Milwaukee, Wis.

THE Firestone Tire & Rubber Company of Akron, Ohio, have a full-page announcement in this issue devoted to their tires and demountable rims, to which the attention of our readers is directed. Very many of our readers will no doubt be interested in their Non-skid tires and demountable rims. The Firestone goods can be obtained of dealers everywhere, or further particulars concerning them will be sent on application.

THREE INTERESTING BOOKLETS FREE.—Most of our readers, without having their attention directed to the matter, will see the announcement on our front cover of the Maxwell-Briscoe Motor Co., Ivy street, Tarrytown, N. Y., offering to send three booklets of interest to automobilists free of charge. But look over their advertisement, and if you are interested, send them a postal card or letter for the booklets and mention this journal.

To Get the Best Out of Tires.

To make tires last, says J. A. Braden of the Diamond Company, and give the largest mileage possible keep them well inflated. A tire consists of three parts—the casing, the inner tube or air chamber and the air itself. Conscientious tire manufacturers make the casings and tubes the best that their experience teaches them, but it is up to the tire user to furnish the air. It is considered a liberal estimate that a tire well inflated will give twice the service of one run insufficiently pumped up, though it is granted the tire run soft rides easier. In other words, the automobile owner is safe in guessing that his tires are too soft if those in the tonneau utter no word of protest when the car goes over rough roads at speed. Any tire should be pumped up until it stand round under a full load. Even air gauges should be disregarded when they fall short of producing the effect of having the tire stand up under the full load.

The worth of plenty of air was demonstrated by George Butler, the Chicago driver who won the first prize of \$1,000 in a national competition for lowest upkeep. Butler got an average of 11,209 miles of service each in 17,000 miles of running, but he inspected his tire equipment as regularly as his oiling system and added air when necessary.

The length of life of tires is considerably shortened by allowing them to stand for any great time in water or in places that are very damp. But the water rots the fabric and not the rubber.

Tie a small piece of red material to positive wires in the ignition system. It often saves much trouble.

Rubberlife— A Tire Preservative—

doubles the life of your tires, and so, cuts your tire expenses almost in half. Besides, it makes your riding easier by keeping your tires always lively and resilient.

Rubberlife is a liquid, and you can apply it to your tires yourself with little effort. One gallon will keep four tires in shape for a year.

Rubberlife is \$7.50 a gallon and \$4 a half gallon. We positively guarantee that Rubberlife will not injure any tire.

Save the price of new tires.

If you store your car this winter you can save the price of a new set of tires next spring by investing in a gallon of Rubberlife now. No tires will rot if treated with Rubberlife before they are stored.

SPECIAL OFFER COUPON

Send this Coupon and \$2.25 for a special trial can of Rubberlife.

Name _____

Address _____

A.D.R. Jan.

RUBBERLIFE SELLING COMPANY,
1340 Real Estate Trust Building,
Philadelphia, Pa.

WANT ADVERTISEMENTS.

Under this head will be printed advertisements of shops for sale or to rent, or shops wanted, or situations or help wanted, or tools or machines (second-hand) wanted or to exchange, at the uniform price of two cents a word, which will include the address, for each insertion, payable in advance. No advertisement will be inserted for less than 30 cents, however small.

Remittances can be made in postage stamps if more convenient. Address,
MOTOR VEHICLE PUBLISHING CO.,
24 MURRAY STREET, NEW YORK.

COMMERCIAL MOTOR VEHICLES—Read the "Power Wagon" for reliable information concerning motor trucks, motor buses, motor cars and other machines employed for business purposes. Issued monthly; single copies, 10 cents; \$1 a year. The most valuable paper of its kind published. The Power Wagon, Metropolitan Block, Chicago.

TOPS—Until further notice, runabout tops \$20, touring car tops \$35. C. G. Meyer & Son, Tiffin, Ohio.

"STEAM, Steam, Steam, That's The Stuff"—All Steam Car Owners should subscribe for the "Steam Motor Journal" a 28 page illustrated monthly devoted exclusively to the interests of the steam propelled automobile. \$1.00 per year, sample copy 15 cents. Chas. D. Sherman, 113 Orchard Road, New Haven, Conn.

ONE 1907 REO TOURING CAR—Top and detachable tonneau, solid tires, all in good shape; quick buyer's price, \$425. F. Herbst, Wilmington, N. C.

DO YOUR OWN BRAZING—Aluminum solder, cast iron brazing compound, formulas 50 cents each with complete instructions, Alexander, 193 So. Oxford St., Brooklyn, N. Y.

ATTENTION—AUTOMOBILE BARGAINS, closing out balance of stock at half prices. Write us your wants. Box 275, Burlington, Wis.

STANLEYS—Exceptional bargains, due to many owners ordering the new models. Choice of many cars. Prices are lowest now. Macker-Tyler Co., 31 Central St., Worcester, Mass.

FOR SALE OR TRADE—My V S Patent Car Lock for Boats. Will take a good automobile in part payment. Call on or address Lock Box 18, Chase, Kansas.

A WINNER. MAGICLEAN WOOD POLISH—Entirely different and far superior to all others. For Auto Bodies, Tops and Upholstery. Made under formula of famous German "Holz Glanz." Cleans like magic, with hard, glassy, glossy, lasting lustre. No acids, no alkali; absolutely harmless. Price \$1.00 quart, \$2.50 gal. Express prepaid. Agents wanted, easy seller, large profits. F. H. Schmoeger, Sterling, Ill.

AUTO 1909 CASES AND TUBES—Morgan & Wright, Pennsylvania, name buffed. Clincher, Dunlop and quick detachable Clincher.

Size	Case Tube	Size	Case Tube
28x2½	\$8.50 \$2.75	32x3½	\$18.00 \$4.25
28x3	11.55 3.10	32x4	23.10 4.95
28x3½	16.40 3.85	34x3½	19.35 4.50
30x3	12.00 3.30	34x4	24.85 5.30
30x3½	17.05 3.95	34x4½	30.30 7.40
30x4	21.80 4.40	34x5	42.25 8.50
31x4	23.25	31x4 fits 30x3½ rims.	

Single tube tires 28x2½, \$10; 28x3, \$12. Seconds \$2 less. I ship, pay for tires after examination. Wm. Vanderpool, Springfield, Ohio.

AUTOMOBILE INSTRUCTION—The West Side Y. M. C. A. Automobile School gives a practical course in shop and road practice in four or eight weeks, day or evening. Provision made for out of town men. 322 West 57th St., N. Y. City.

WE NEED READY CASH—Will sacrifice the following cars: 1907 Model "G" Franklin, 1909 Reo touring car, 1908 new Model "S" Ford Runabout, 1908 Stanley Steamer touring car, Model "H" Maxwell touring car, 1908 Reo touring car, Model 34 Rambler, 1909 Chalmers-Detroit Thirty, 1907 60 H. P. Thomas Flyer, four-cylinder Searchmont touring car—make us an offer. 1905 White Steamer—make offer. Single cylinder Oldsmobile, \$50.00. Pope Waverly Electric with automatic charging outfit. For specifications and prices, address, Box 356, Reading, Pa.

FOR SALE

In order to make room for our new factory, we offer for sale at a low price:

1-18 h. p. 2 cyl. chassis.
1-18 h. p. 2 cyl. light delivery car.
1-20 h. p. 2 cyl. second-hand touring car.
1-14 h. p. 2 cyl. second-hand Ford motor and transmission.
1-10 h. p. single cyl. Cadillac motor and transmission.
1-12 h. p. single cyl. Olds motor and transmission.
1-20 h. p. 2 cyl. 4 passenger surry, 36-in. wheels.
1 chain drive running gear, runabout type.

BRENNAN MOTOR MFG. CO.,
103 Grape St., Syracuse, N. Y.

FOR SALE—"Model" Automobile, 24 H. P., five-passenger; in the very best of condition. Price \$450. Address, L. B. 82, Stratford, S. D.

FOR SALE—or exchange for automobile, patent and dies for metal novelty. Box 312, Moulton, Ia.

\$20.00—New 4-cyl. Splittorf Dash Coil.
\$22.50—New 22-25 H. P. Radiator and Hood.
\$35.00—60 H. P. Radiator and Hood.
\$7.00—4-feed Kinsey Force Feed Oilier.
\$10.00—6-feed Kinsey Force Feed Oilier.
\$2.50—15 and 20-gal. Gasoline Tanks.
\$3.00—Mufflers.
\$1.00—Each Quick Detachable Rims.
\$0.50—Each 34x4, 34x4½ and 30x3 Clincher Rims.

\$15.00—Set Hartford Shock Absorbers.
\$10.00—Set 4 Wheels with Clincher Rims, 30x3½, new, less hubs.

These are all highest class accessories. Send for complete list. I. L. Breakstone, 1712 Michigan Ave., Chicago, Ill.

FOR SALE—Clincher Rims, 60 cents each. 30x3, 34x4, 34x4½. Address I. L. Breakstone, 1712 Michigan Avenue, Chicago, Ill.

FOR SALE—Set of castings and blueprints for two-cycle bicycle motor. H. E. Burlingame, 53 Redwing St., Providence, R. I.

FOR SALE—The Coburn Auto Cleaner and Polisher removes grease and stains without injury and brightens dull varnish. Also is unexcelled as a furniture polish. Sample by mail, 25 cents. Live agents wanted. Address, A. A. Coburn, Box 753, Whitewater, Wis.

FOR SALE—Genuine Bargain—Pierre Arrows, \$1,000; Peerless, \$1,200; Renault, \$1,000; Fiat, \$1,000; 1901 Reo, \$600; 1907 Olds Roadster, \$650; 1908 Pope Hartford, \$850; 1906 seven-passenger Packard, \$1,000. Also Premiers, Loziers, Stearns, Buicks, Fords, Camerons, Stevens, Marmon. Also chassis bodies, tops, taxi-cabs, sightseers, trunks. Correspond with me to buy or sell. R. B. Corbett, 524 W. 36th St., New York.

FOR SALE—Four 20-passenger Mack Sight-Seeing cars. Several taxicabs, delivery wagons. R. B. Corbett, 524 W. 36th Street, New York.

FOR SALE—BODIES, CHEAP. Touring car, detachable tonneau and runabout bodies in several sizes at close-out prices. Give length and width wanted. Dayton Body Co., 624 Geyer St., Dayton, O.

Save your old dry cells. New use. In demand everywhere. Complete instructions for 20 cents. A. M. Ericson, Hector, Minn.

FOR SALE—12-inch Challenge Emery Grinder and counter-shaft, \$12.00.
Two 10-inch by 2-inch Emery Wheels, No. 46 and No. 30, \$4.00.
Split Wood Pulley, 28-inch by 4 inch, \$2.50.
Split Wood Pulley, 18-inch by 5-inch, \$2.00.
Three shaft-hangers, 14 inches, 1¼-inch shaft, \$4.50.

Above used only one month. Carlisle & Finch 8-ampere Direct Current Dynamo, cost \$50.00, \$25.00. Address, H. E. Jacob, Jr., Mount Airy, N. Y.

ATTENTION, AUTOMOBILISTS—Fur-lined coat, never worn; lined throughout with Australian mink, with magnificent Persian lamb collar. Will sell for \$35; cost \$200 in Canada. Pair cinnamon bear robes, \$30; cost \$175. Write, J. Loew, 520 West 145th St., New York.

WANTED—Am looking for a bargain on a two to three-ton Motor Truck, second-hand, in good condition. Address, "M," 127 N. Jardin Street, Shenandoah, Penna.

FOR SALE, or exchange for automobile, patent and dies for metal novelty; Box 312, Moulton, Ia.

PUMP FOR A PRIVATE GARAGE.

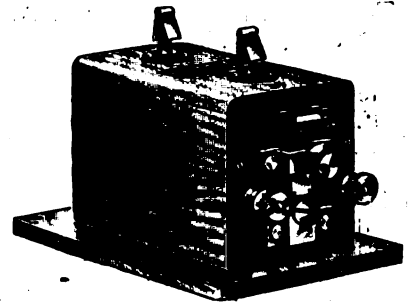
The illustration shows a new pump designed for a private garage where they want the very best that is made at a reasonable price. It pumps a given quantity to a stroke of the lever, and is fitted with shut-off valve and anti-drip nozzle; it is also



fitted with hose connections. It is made of the best material and workmanship that can be put into a pump. It acts easily, is powerful and there is nothing better of the kind made. For price and other information address Eastern Oil Tank Co., Lowell, Mass.

MACLET SWITCHES AND COILS.

These well-known electric specialties are manufactured by Geo. N. McKibbin of South Norwalk, Conn. The Maclet coil, herewith illustrated, is the outcome of years of experience in building and operating coils for X-ray and wireless telegraph work, and it embodies novelties not found in any other coil. It is made both in launch type and also in dash board finish for automobiles. The same manufacturer is finding a good sale for the Maclet



A Novel Coil.

switch which is illustrated this month in an advertisement. This switch is now in its fourth year, and is in general use everywhere where gas engines are in service, giving universal satisfaction. The safety device by which when the lever is thrown off one contact, it remains off. Will save the price of the switch the first day it is in service, as the lever cannot fall back and start the engine or run down the batteries. Write for price and particulars to Geo. N. McKibbin, Elmwood St., South Norwalk, Conn., not forgetting to mention THE AUTOMOBILE DEALER AND REPAIRER.



Branch Office: New York

Please mention the Automobile Dealer and Repairer when writing to advertisers.

GRIP-ON BRAKE BAND LINING.



AUTOMOBILE BRAKE BAND LINING

A Unique and Economic Discovery

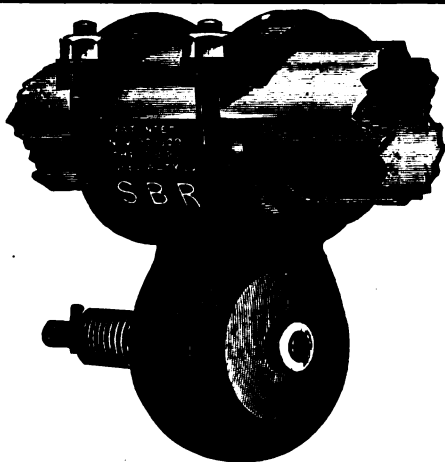
Will not disintegrate

Will not become hard

Will wear uniform

Has a special reinforcement that takes up sudden jars and strains and saves body of the lining

NEW YORK LEATHER BELTING CO., { 44 Franklin St., CHICAGO.
51 Beekman St., NEW YORK.



The S. B. R. Muffler Cutout

Tells whether all your Cylinders are firing or not.

Saves clogging of your Muffler.

Eliminates back pressure when full power is needed.

A most effective warning signal.

Easily applied in few minutes.

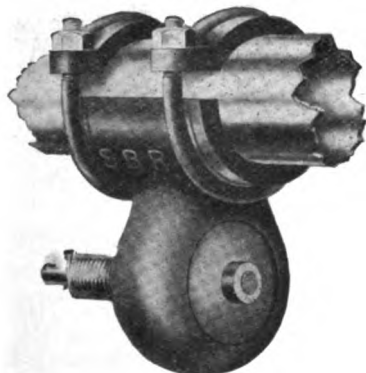
PRICES: 1-1 1/4-1 1/2 in., \$3.50; 1 3/4-2 1/4 in., \$4.00; 2 1/2-3 in., \$4.50.

Above sizes apply to outside diameter of exhaust pipe.

THE S. B. R. SPECIALTY CO.
1777 Broadway, NEW YORK

S. B. R. MUFFLER CUT-OUT.

The granting of Patent No. 942,011 under date of November 30, 1909, on various types of muffler cut-outs brings attention to the S. B. R. type shown herewith.



The S. B. R. Muffler.

This cut-out acts as a telltale on your motor, indicating at once whether all of the cylinders are firing properly or not. The bottom part acts as a pocket, catching most of the carbon passing from the motor to the muffler. When the cut-out is open this carbon is blown out and caught quickly in the muffler. The valve acts against the exhaust pressure, thus preventing the whistling caused by valves which open with the exhaust. The opening is of

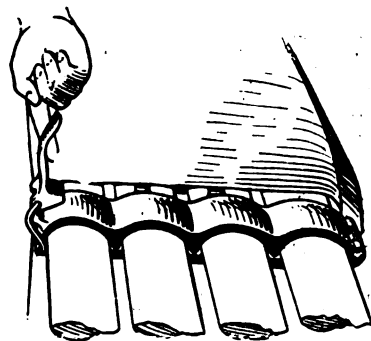
such pressure as to thoroughly relieve the back pressure when cut-out is open, and the bark of the exhaust is a very effective warning to pedestrians. This cut-out can be applied in a very few minutes by sawing a V-shaped piece out of the exhaust pipe, and removing same, then clamping the cut-out in place, and operating same from seat by means of a foot pedal or lever. An ingenious arrangement of wire asbestos gaskets does away with boring out the cut-out. A new 1910 scale of prices is announced and infringement of the type of cut-out covered by this patent will be vigorously prosecuted.

A. S. B. TREADS.—The Queen Mfg. Co. of Webster City, Iowa, have an announcement in this issue descriptive of their A. S. B. Treads. They claim that by the use of these treads there will be no punctures, skidding, blow-outs, or any fear of rutty roads, no extra inner tubes, etc. As they want a few cars equipped with these treads in every town, for advertising purposes, they are making a special proposition to send sample sets at a big discount. Now is the time to get them if you are interested. It may be worth your while to investigate them anyhow.

AUTO TOP HOLDERS.

The Bair auto top holder is something that should at once command the attention of car owners, for something effective of the kind has long been needed. It is claimed that it will prevent jarring, jolting,

chafing, rattling and broken bows. It prevents the fabric from rubbing and the bows from pounding together or spreading, consequently, there is no annoying rattling. The Bair holders keep the entire weight of the top off the lower bow. The top cannot come down with a bang on the



The Bair Auto Top Holder.

bottom bow every time the car hits a rut. The entire top is held firm in such a manner that the top becomes part of the car. The weight, jolting, etc., is then transmitted to the springs of the machine—where it belongs. The illustration gives some idea of the simplicity, and the durability of this new device. It is manufactured by the Auto Specialties Mfg. Co., Chicago, Ill., to whom letters should be addressed for further information.

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Semi-Annual Manufacturers' Clearing Sale of TIRES AND TUBES

As the season is far advanced and all the factory orders are completed, the tire manufacturers find on hand a number of sizes they have too many of. They are closing out this surplus stock at prices less than actual cost of manufacture.

We guarantee these strictly new 1909 goods or refund your money, if found unsatisfactory, upon receipt. Orders filled upon receipt of 10 per cent. of order to cover us on transportation charges.

This lot includes Morgan and Wright, Hartford, Continental, Diamond, Goodyear, Ajax, and all the best makes of tires. Will sell the lot, while they last.

CASINGS AND TUBES TO FIT ANY CLINCHER OR UNIVERSAL RIM

SIZE	CASINGS	INNER TUBES	SIZE	CASINGS	INNER TUBES
28x3	\$10.50	\$3.00	34x3½	\$16.00	\$4.25
30x3	12.00	3.50	34x4	20.00	6.00
30x3½	15.00	4.50	34x4½	22.50	7.00
30x4	17.50	5.00	34x5	20.00	6.50
31x4	18.00	5.00	36x3½	12.50	4.25
32x3½	15.00	4.00	36x4½	22.50	7.00
32x4	18.00	5.50	36x5	24.50	7.50
33x4	20.00	6.00			

SINGLE TUBE TIRES

26x2½, \$9.00 28x2½, \$10.00 28x3, \$12.00

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Wrenches

Burkley Supply Co.	467
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GASOLINE STORAGE OUTFITS.—These are supplied by the Janney, Steinmetz & Co., of Philadelphia, Pa., with a capacity of from 55 to 110 gallons. The company has just brought out a new leaflet giving full particulars, which will be sent to any reader interested enough to write for it.

OF INTEREST TO BUICK OWNERS.—The F.-B. Company of Columbia, S. C., is manufacturing a valuable device for use on the Model No. 10 Buick. This is known as the F-B Automatic Clutch Releaser. It is used to interlock the service brake and high speed clutch, or to interlock the high and low speed clutch, or two may be used on the same car. It makes, so the manufacturers claim the No. 10 Buick the easiest controlled car made. Full particulars concerning this device with numerous testimonials will be sent to any reader interested, who will write for it. Address as above.

We understand that the B. F. Goodrich Co. during 1910 will celebrate its fortieth birthday. At the beginning the company

employed 55 men in a small building, manufacturing rubber goods. To-day this company employs 5,000 men and its factory covers 25 acres.

FRY PLUGS.—Most of our readers will notice the attractive announcement of the Standard Sales Company, 123 West 68th street, New York City, on our front cover, without directing attention to it, and many of them will no doubt want to fill out the coupon attached and take advantage of the low offer made by this company on spark plugs.

FWLER'S CRANK SHAFT LATHE DOGS.—Repair men are requested to note the advertisement of The Fowler Lamp & Mfg. Co., 2337 Wabash avenue, Chicago, Ill. They manufacture a crank shaft lathe dog, which every repairer ought to know about. You can order one from your local dealer, or you can write to the company and get full particulars with price list. In writing, mention this paper.

CAST IRON BRAZING OUTFIT.—Every shop ought to have the brazing outfit of the A. & J. Mfg. Company, 421 W. Randolph street, Chicago, Ill. They say it is a money maker and we have no doubt about it. Write to them for prices and mention this paper.

A \$60 LATHE.—The Shepard Lathe Company, 141 West 2d street, Cincinnati, Ohio, offer a lathe for \$60. They make other lathes of course and other machines. Send for their catalogue and mention this paper.

EMPIRE TIRE BRANCH OFFICE.—The Philadelphia Branch of the Empire Tire Co. of Trenton, N. J., is located at 322 N. Broad street, and is managed by E. B. Richardson, who has been connected with this company for a number of years. Our readers favorably located are invited to call at the Philadelphia branch.

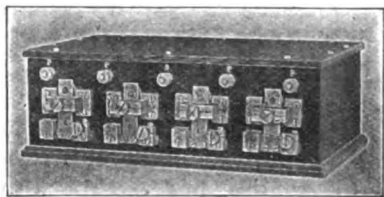
SIMPLIFIED TIRE REPAIRING.—See the full page announcement in this issue of the C. A. Shaler Company Box X, Waupun, Wis. Cut out the coupon attached to the advertisement and add your name and address, and they will send you free of charge their Garage Hand book with description of the Shaler Electric Vulcanizers and best discounts on the same.

THE KLAXONET.—Very many of our readers no doubt will be interested in the full-page announcement in this issue of the Klaxon Company, No. 1 Madison Ave., New York City. The Klaxonet is a modification of the Klaxon, conceded by automobilists to be an ideal form of warning, far superior to the ordinary warning device. The manufacturers say that the Klaxonet is a miniature of the Klaxon, that it operates on the same principle, but is of slightly simpler construction. It is attached even more readily than the Klaxon, and it uses only 2½ amperes or a six-volt current, dry cells or storage. Its warning note is a distinctive metallic Klaxon tone, not so loud but of higher pitch. The Klaxonet is adapted to cars running up to 15 H.P. But note the advertisement and either see your dealer about it or write direct to the company, mentioning THE AUTOMOBILE DEALER AND REPAIRER.

"ATTENTION."—Under this heading the Mattson Rubber Company, of Lodi, N. J., has an advertisement in this issue asking our readers to send for prices of their "Wrapped Tread and Moulded Clincher Tires and Inner Tubes." This company also makes a specialty of automobile repair stocks and fabrics for the repair man, and would like to quote rates. In writing, kindly mention this paper.

Subscribe to the "Automobile Dealer and Repairer," \$1.00 Per Year.

Please mention the Automobile Dealer and Repairer when writing to advertisers.



SCHUG Electrical Specialties



Are the
World's Best
by Every Test.



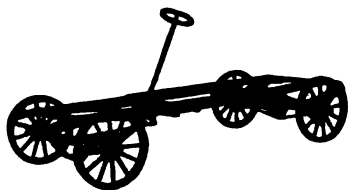
SPECIAL PRICES TO THE TRADE.

WRITE TO-DAY FOR CATALOGUE.

SCHUG ELECTRIC MFG. CO., DETROIT, MICH., U. S. A. 326 E. JEFF
SEATTLE MARINE SUPPLY CO., Seattle, Wash., Pacific Coast Agents.

YOU CAN'T GO WRONG

If you will use our Running Gears, Wheels, Axles, Bodies and other parts. We make single or double chain drive, also shaft drive running gears with wheel base up to 138 inches.



Our Prices will Interest You

We also make bodies, wheels, axles, steering devices and cars ready for power.

Write for our new catalog at once.

**BORBEIN AUTO CO., 2109-11 N. 9th St.
ST. LOUIS, MO.**



You need not be afraid of the Devil

If you carry an M. & M. QUICK REPAIR OUTFIT in your tool kit. Repairs made anywhere, any time, any place. It's instantaneous, positive and self-vulcanizing. It's reliable too, and you need not be an expert to use it. Just follow directions and you will be surprised how easy repairs can be made.

With each outfit you can make about \$20.00 worth of repairs. Start now by curtailing expenses and repair your own punctures.

Outfit consists of ¼ pint Cement, ¼ pint Acid & Cement Brush, 1 Acid Brush, Emery Cloth, complete directions, etc. Complete, \$1.00.

At all dealers and jobbers, or, sent prepaid on receipt of price.



Manufactured by **THE M. & M. MFG. CO., Akron, Ohio.**

LENGTHEN THE LIFE OF YOUR TIRES



BEFORE

GET 5,000 to 10,000 miles more running out of your old tire casings by letting us triple tread them. No matter how worn or ragged they are, we can, at small cost make them equal to new. They will be Puncture Proof: Non Skidding. They will run thousands of miles with never a puncture or a blow out.

Using the original casing as a foundation we build up practically a new tire. A heavy coat of new rubber of graduated thickness is first applied to the old casing. This is entirely covered with the best water-proofed French Chrome Leather which has been rubberized by our own special process.

The fibres of the leather are thoroughly permeated with the elasticity of the rubber. It has the appearance and resiliency of



A sectional view of Casing which has been triple treaded. Note the layer of rubber which protects the inner casing and the outer covering of rubberized leather with the anti-skid steel studs on top.

rubber combined with the toughness and wear resisting qualities of the best and most durable leather.

And just at the point where the most wear comes we add a third thickness of the rubberized leather. This is studded with from three to six rows of hardened steel studs (according to the size of the casing), this making a practically skid-proof "new tire."

By bringing your old tires to us to be triple-treaded, you can cut your tire bills in half. The cost of triple-treading is small—less than the price of an inferior new tire—hardly more than a rubber retread. Don't buy new tires, send the old ones to us. Anyway ask us for further details of this form of tire economy.



AFTER

TRIPLE-TREAD AUTO TIRE MFG. CO.

1543 Michigan Avenue, Chicago, Ill.

TELEPHONE CALUMET 2456

Please mention the Automobile Dealer and Repairer when writing to advertisers.

10 Years of Knowing How

HAS MADE

LORD'S LUMINO

The King of Brass Polishes



There is nothing on the market today that can equal it for cleaning and polishing the Metal Parts of Automobiles. We want an agent in every town and city in the United States.

Write to us for our Special Offer, also for the handsome Combination PEN and PENCIL, which will be sent only to those who use their own letter heads.

Address F. T. LORD POLISH CO.

37 Hovey Avenue, Cambridge, Mass.

JUST OUT!

WRITE for our new 24-page booklet, "USE AND CARE OF MAILING LISTS." If you are at a loss to plan your Fall advertising campaign, or if you are hesitating between magazine and direct advertising, this booklet will put you on the right track.

If you are at present using Mailing Lists, we may be able to give you some new ideas as to the expeditious and economical handling of them. The book is full of useful suggestions for the advertising manager. It also gives a synopsis of all the state registration laws.

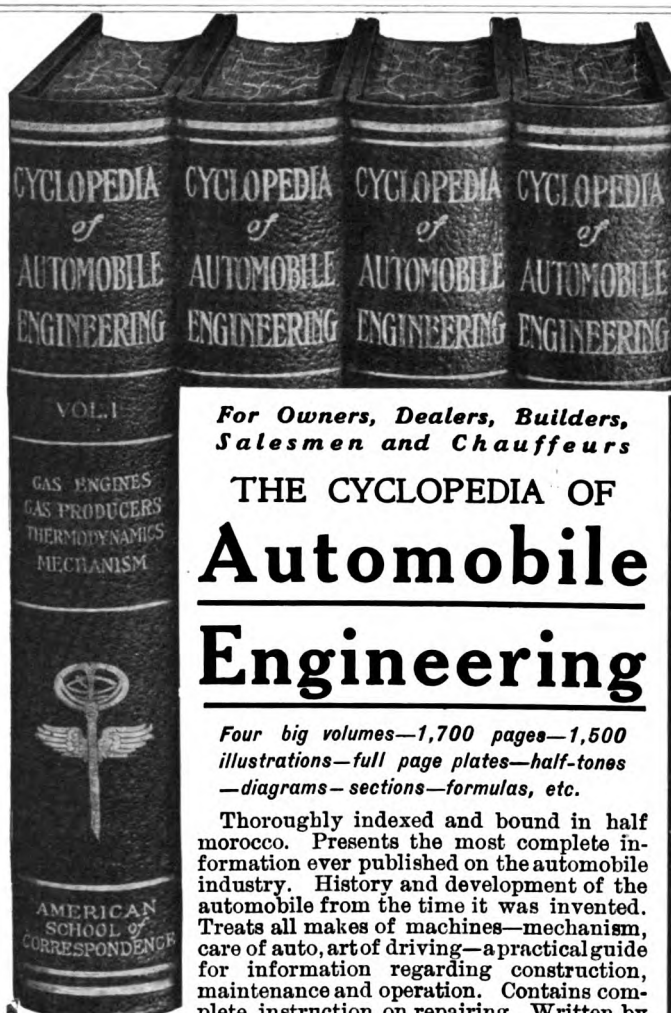
We Make No Charge.

The book is free to the advertising manager. We only ask that you write us on your firm's stationery, as we have only a limited number of the books and we do not care to waste any copies.

Automobile Advertising Company,

422 State Life Bldg., Indianapolis, Ind.

We will be glad to instruct you as to the cost and how to install a card filing system, or to figure out the cost of a circularizing campaign.



For Owners, Dealers, Builders, Salesmen and Chauffeurs

THE CYCLOPEDIA OF Automobile Engineering

Four big volumes—1,700 pages—1,500 illustrations—full page plates—half-tones—diagrams—sections—formulas, etc.

Thoroughly indexed and bound in half morocco. Presents the most complete information ever published on the automobile industry. History and development of the automobile from the time it was invented. Treats all makes of machines—mechanism, care of auto, art of driving—a practical guide for information regarding construction, maintenance and operation. Contains complete instruction on repairing. Written by experts.

EXAMINE THE BOOKS AT OUR EXPENSE

We will send you a complete set by prepaid express upon receipt of coupon. Keep them five days—give them a thorough and careful examination. If you do not wish to keep the books, advise us and we will have them returned at our expense. If you keep the books send us \$2.00 in five days and \$2.00 a month until special introductory price of \$12.80 has been paid. Regular list price \$24.00.

IMPORTANT SUBJECTS COVERED

Automobile Operation—Car—Trouble—Breakdown—Repairs—Motor Cycles—Automobile Power Plants—Cooling and Oiling Systems—Ignition Systems—Spark Coils—Buying a Motor Car—Gasoline, Electric and Steam Cars—Tires—Punctures—Accessories—Driving—Gas and Oil Engines—Fuels—Care of Gas Engines—Electricity—Storage Batteries—Direct Current Motors—Mercury Vapor Converter—Primary Batteries—Steam Engines and Boilers—Valve Gears—Indicators—etc.

SPECIAL OFFER IF YOU MAIL COUPON PROMPTLY.

For a short time we will include, as a monthly supplement, for one year, the TECHNICAL WORLD MAGAZINE. This is a regular \$1.50 monthly, full of Twentieth Century Scientific facts, written in popular form. Also contains the latest discussion on timely topics in invention, industry, etc. The magazine will be mailed immediately upon receipt of coupon.

American School of Correspondence, Chicago, Ill., U. S. A.

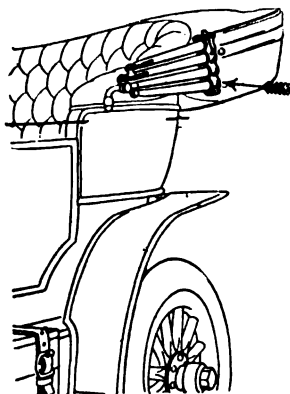
FREE OFFER COUPON

American School of Correspondence:

Please send set Cyclopedia of Automobile Engineering for five days' free examination; also Technical World for 1 year. I will send \$2.00 within 5 days and \$2.00 a month until I have paid \$12.80, or notify you and hold the books subject to your order. Title not to pass until fully paid.

NAME.....
ADDRESS.....
OCCUPATION.....
EMPLOYER.....

Auto Dealer and Repairer—1-10.

USEFUL, DURABLE,
ORNAMENTAL.

TOP TROUBLES STOP

WHEN THE BLAIR AUTO TOP HOLDERS (Pat'd) ARE USED

THEY ARE SUPERIOR TO ALL OTHER DEVICES OR COMBINATIONS NOW IN USE, and absolutely prevent jarring, jolting, chafing, rattling; or broken bows. No Straps or Buckles.

Practically Indestructible. Easily Applied. Easily Operated.

WEIGHT. The holders keep the entire weight of the top off the lower bow. The top cannot come down with a bang on the bottom bow every time the car hits a rut.

FIRM. The entire top is held as in a vice in such a manner that the top becomes part of the car. The weight, jolting, etc., is then transmitted to the springs of the machine—where it belongs.

MONEY BACK IF NOT SATISFACTORY.

Ask Your Dealer for Demonstration or Send for Illustrated Catalog. Dept. "B."

AUTO SPECIALTIES MFG. CO.,

Room 811.

79 Dearborn Street, Chicago, Ill.



DON'T BUY NEW TIRES YET!

Make your old ones last by using **THE AUTO TIRE RE-ENFORCEMENT**, which re-enforces the whole tire from the inside, the most practical and successful way to strengthen a tire. Made of three and four plies of frictioned fabric, vulcanized and shaped to fit the whole inside of the tire. Prevents blow-outs, rim cuts and punctures and adds many miles to the service of any tire. Anyone can apply in a few minutes. They re-enforce the whole tire and cannot possibly injure either tube or casing.

We make all kinds of tire re-enforcements—reliners, inner shoes, tire sleeves, and blow-out patches, and the materials used by us will stand rigid inspection and test.

Send for samples of materials used and get our catalog and prices.

AUTO TIRE RE-ENFORCEMENT CO., E. 7th Street, Auburn, Indiana.

"Akron" Repair Kit

Makes the repair permanent, as it produces the same effect as vulcanization. The acid cures the cement to the rubber or part to be repaired, which makes it one solid piece of rubber and impossible to separate.



"Akron" Repair Kit
Price, Delivered, \$1.00

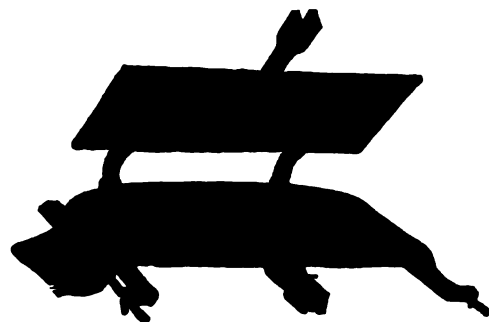
This Pure Aluminum Vise is intended to be used in applying patches to inner tubes. It holds the patches firmly in place while the rubber cement is setting and vulcanizing.

It prevents the patch edges from curling and positively assures you of a permanent repair to your inner tube. For use with any size inner tube. Small, light and strong. An absolute necessity for every automobile owner.

We also make the

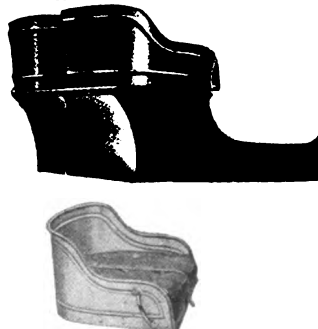
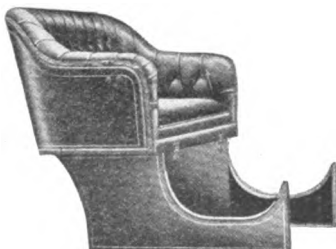
"Akron" Inside Repair Patch,
"Akron" Tire Boot,
Motor Cycle Boots and Patches,
Top Dressing for Autos.

Ask your dealer, or write direct. We make regular inner tube patches, six sizes.

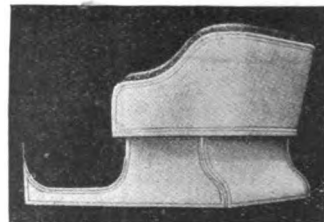


"Hold Tight" Aluminum Vise
For Inner Tube Patching,
Price, Delivered, \$1.25

THE EMPIRE MANUFACTURING COMPANY, 20 Beech St., Akron, Ohio



Send for Catalogue "L"
and Prices.



SEATS =

The Pictures tell the Story

We make 'em for ANY CAR, such as

Buick, Model 10
Ford, any model
Maxwell, "
Brush

Reo
Mitchell
Cadillac
E. M. F. 80

Hudson 20
Chalmers-Detroit
Studebaker-Flanders
De Tamble

Parry
Pope-Toledo
Jackson
Wayne

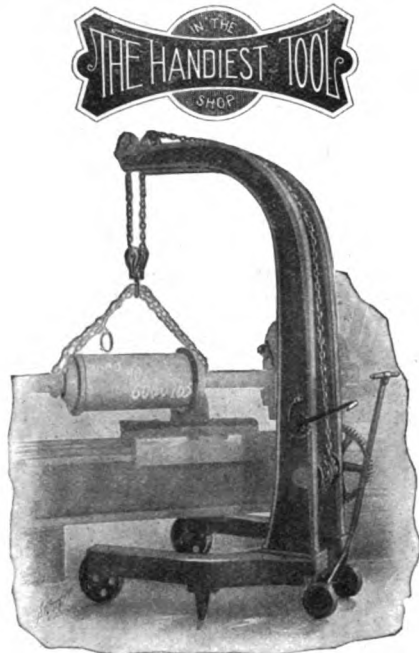
Hupmobile
Winton
Overland
and others

If you are the owner of a Ford Runabout, write us at once. We will present you with a NEW CAR for \$88.50.

AUTO REBUILDING CO., 1311 Wabash Ave., Chicago, Ill.

Please mention the Automobile Dealer and Repairer when writing to advertisers.

HOIST FOR AUTOS



ONE MAN DOES WORK OF TWENTY WITH OUR PORTABLE FLOOR CRANE AND HOIST. Pays for itself dozens of times. CONSTRUCTION, absolutely stiff. Cannot bend. Order at once at right price. Don't delay. Write—NOW.

The Canton Foundry & Machine Company

602 E. 8th ST., CANTON, OHIO.

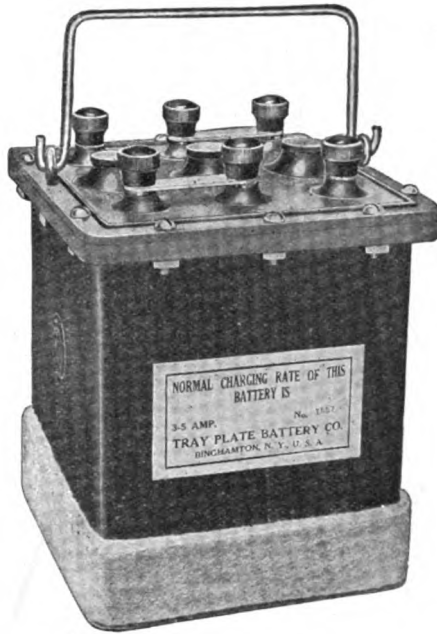
Also Manufacturers

"UNIVERSAL" AUTO TURNABLES.



F. W. Ofeldt & Sons,
Nyack-on-Hudson, N. Y.
Manufacturers of

Blue Flame Kerosene Burner,
Safety Water Tube Boiler,
Automatic Water Regulator,
Automatic Fuel Regulator,
Feed Water Heater,
Compound Steam Engines,
New Automatic Fuel Feed.
For all makes of steamers, including White's and Stanley's. Write for new Catalogue.



**6 Volts, 60 Amperes.
Type A, No. 660.**

HIGH EFFICIENCY BATTERIES

FOR

Motor Boats
Automobiles

OR

Gas Engines



A GOOD FAT HOT SPARK

A BATTERY OF GREAT
CAPACITY



OVER 50% OF THE LARGEST AND BEST
JOBBER'S ARE HANDLING THIS BATTERY

LIGHT YOUR CAR OR BOAT BY ELECTRICITY

SEE OUR NEW GUARANTEED LIGHTING SYSTEM AT
THE NEW YORK, CHICAGO, AND BOSTON SHOWS

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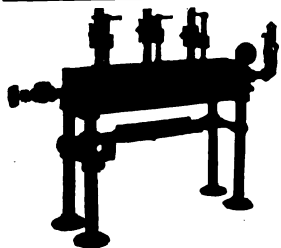
Jarman Sales Co.,	-	-	-	-	New York
Standard Tire & Rubber Co.,	-	-	-	-	Boston
Standard Automobile & Supply Co.,	-	-	-	-	Chicago
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TRAY PLATE BATTERY CO.

1902
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BINGHAMTON, N. Y.

1902
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The "Boilerless" Steam Vulcanizer

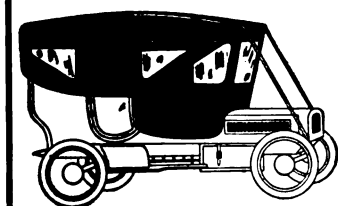
Underneath the square semi-steel body is fitted our special gas burner, thus doing entirely away with boiler for inner tube work.

Gasoline burner and tank supplied instead of gas if desired.

Furnished complete with steam gauge, safety valve, filling valve, air cock, and our well-known quick acting clamps. LOW COST. HIGH SATISFACTION. Immediate shipment. Write us to-day.

WISHART-BURGE MACHINE WORKS,

64-66 SOUTH CANAL STREET, CHICAGO, ILL.



AUTO TOPS, \$25.00

Auto Bodies in the White, Painted or Trimmed. Write for Auto Catalogue and quotations.

BUOB & SCHEU,

Wind Shields and Dust Covers.

No. 1000 Broadway, Cincinnati, Ohio.

Please mention the Automobile Dealer and Repairer when writing to advertisers.

The Fox Typewriter



Free Trial

You pay nothing—you promise to pay nothing! At my expense—even to the expressage—I will place the Fox Visible Typewriter in your office, or home, alongside your present typewriter—or for comparison with any other typewriter—and if the Fox Visible Typewriter is not better than the best of the others—not merely "Just as good"—I don't want you to buy it.

To Automobile Dealers

If you knew positively that by the persistent and judicious use of a typewriter you could in 1910 **double your last year's business** you wouldn't hesitate an instant in purchasing one! We have just issued a large illustrated folder showing how the big city concerns have built up their immense businesses and shows how **anyone in any class of business** can increase that business by means of the typewriter. There are hundreds—yes, thousands—of persons in your territory who are interested in Automobiles, and Automobile Supplies and Repairs, and these parties are going to purchase **somewhere**. Why not send to-day for this folder and let me show you how the typewriter will enable you to get this business?

The new **FOX VISIBLE TYPEWRITER** represents to-day the highest type of typewriter building and is **absolutely unequalled** by any other typewriter on the market. It gives full Visible Writing, has a back Space Key, Tabulator, Two-color Ribbon with Automatic Movement and Removable Spools, Interchangeable Carriages and Platens, Line Lock, Stencil Cutting Device and Changeable Speed—it is extremely **Durable** and almost **Noiseless**.

I belong to no trust—no combination—and no one dictates to me at what **PRICE** I shall sell or on what **TERMS** I shall sell.

All I want you to do is to fill out the attached coupon and send it to me personally. Send for my catalog anyway.

SENT ON FREE TRIAL

Date _____ 19__

W. R. FOX, President, Fox Typewriter Co.,
6612-6622 Front St., Grand Rapids, Mich.

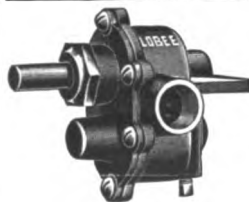
Dear Sir:—Please arrange for the free trial of a Fox Visible Typewriter at your expense—not mine—without any obligation on my part. I will return the typewriter to you within ten days, if I decide not to purchase it.

Name _____

Address _____

Business _____

H2



If you want good circulation on your automobile, launch or motor boat, use a

LOBEE PUMP

Write us at once, and we will tell you why, and send price list. Address
LOBEE PUMP AND MACHINERY CO.
14-18 Erie St.,
Buffalo, N. Y.

SE-MENT-OL

will dissolve in the radiator and stop any leak or fix any cracked water jacket

Agents Wanted Everywhere
Northwestern Chemical Co., Marietta, O.



Kearns Model "L"
[For 1910]

\$750.00

Wonderfully Simple
and Simply
Wonderful.

GEARLESS—CLUTCHLESS—VALVELESS—PUNCTURELESS

All objectionable features which have been a source of annoyance to automobile users have been dispensed with in the "Kearns." No waiting, no delay, always ready: Friction transmission, two-cycle air cooled 3-cylinder motor, 18 H.P., are the **IDEAL** features incorporated in the "Kearns." It is a summer or winter vehicle of pleasure, a physician's or business man's car, and a business getter in city or country. Built from the ground up on scientific principles, and must therefore not be misconstrued for a motor buggy that is only assembled and sold at a low price. Consider quality and compare with cars selling at 50 per cent more, and note every time that the "Kearns" competes in construction and style, but sells at a price the average man can afford to pay for a reliable automobile. Let us send you full particulars and catalog. 10 Models to choose from. 1910 output estimated at 1000 cars.

KEARNS MOTOR CAR CO., ADDRESS DEPT. "C," BEAVERTOWN, PA.

PACKARD CABLE



Will Make That Repair Job **SURE**.
Are you getting our pretty Monthly Calendars?
THE PACKARD ELECTRIC CO., Warren, Ohio.

BUY YOUR MOTORS IN JANUARY.

4 1/2 x 4	Opposed Air Cooled	\$60
4 1/2 x 4	" " " "	75
5 x 4	" " " "	80
4 1/2 x 4	Water	80
4 1/2 x 5	" " " "	85
5 x 4	" " " "	85
5 1/4 x 4 1/2	" " " "	100
5 1/4 x 6	" " " "	130

Get our No. 60 Bargain Sheet of other parts.

AUTO PARTS CO., 517 to 523 W. Jackson Boul., Chicago, Ill.



TRY IT
We mean our superior goods
against others

"ERICKA" Hand Soap
It's a Fine Hand Soap
"ERICKA" Auto-Car Soap
Shine and Metal Polish

At All Dealers

AUTOMOBILE SPRINGS

All Styles.

Made or duplicated by
TUTHILL SPRING CO.
578 Polk Street, CHICAGO, ILL.

CAST IRON BRAZING easy with UNIVERSAL FLUXINE

You can solder cracked water jackets easy with
UNIVERSAL SOLDERING FLUID.
Booklet.

Universal Fluxine Co., Urbana, Ohio



Don't Go Thru 1910 without The G-R AIR PUMP

For your garage. Easiest running, most reliable and most durable air compressor ever put out for inflating tires and cleaning cars.

Write us for price and description.
GARDNER-RIX GOV. CO., Quincy, Ill.



ESTABLISHED 1873.
\$60 Lathe. Gap Lathes, Turret Engine Lathes and Shapers, Screw Cutting, Foot and Power Lathes, Hand and Power Planers, Hand and Power Drills, Chucks, Emery Wheels, Outfits. Tools especially for Blacksmiths, Electricians and Bicycle work.

Catalogue Free.
SHEPARD LATHE CO.,
141 West 2d Street, Cincinnati, Ohio.

THE CLEVELAND TWIST DRILL CO.

SETS OF DRILLS TRADE MARK SETS OF TAPER PIN REAMERS
FOR THE GARAGE
New York Cleveland Chicago

THE CLIMAX AIR COOLED MOTORS

are the best automobile motors out. Guaranteed forever against defective material and workmanship. Let us tell you all about them. Write at once for Catalogue.
CLIMAX ELECTRIC WORKS, New Salem, Mass.

"Knipe" Pat. Ball Bearings. Steel Balls.

1/2 Inch Shaft and Up.
No Fitting. Just Push Them On.
10 Cents in Stamps for Sample.

PRESSED STEEL MFG. CO.,
454 The Bourse, Phila., Pa.

Please mention the Automobile Dealer and Repairer when writing to advertisers.

Just What You Want!

Don't Metal Polish Your

life away, but finish the brass parts of your auto with **Stay Shiny—The Marvelous Tarnish Preventive**, and have them look like gold plate all the time. Saves hard, dirty work, time and money. One invisible coating preserves original high polish and absolutely prevents tarnish on lamps, radiators and trimmings for months, under heat, rain, and all weather conditions. Easily applied, easily removed when desired and non-injurious to metal. Fully guaranteed. Price \$2.00 Pint can, with brush. Express Prepaid. Lasts a year. Thousands of auto owners are delighted users of this long looked for article. Garages and Agents make big, easy money, selling **Stay Shiny**. If not sold by Dealer, will send can prepaid upon receipt of price. Write me right now.

F. H. SCHMOEGER,
Sterling, Ill.



Rotary Pumps.

ALL SIZES.

Manufactured by

THE LIPMAN MFG. CO.,

400 Pleasant St., Beloit, Wis.

Send for Catalogue.



LONG BROS.

Manufacturers of

TIMERS

BUICK SPECIALS

Mica and Porcelain

SPARK PLUGS

Built for Service

Write at Once for Booklet and Prices

KOKOMO, IND.

When You Buy, Buy the Best

Buy from the Factory

Americano Cigars are strictly hand made, long filler. Superior quality tobacco. A high grade cigar at a minimum price, equal to what you are paying twice the price for. Sent direct to you from our factory at \$2.00 box of 50, delivered by express, prepaid, any place in the United States.

A. SALOMON & SON, Kalamazoo, Mich.

GAS ENGINE BROKERS.

We save our patrons from 30 to 60% on any Style, Type or Size of Engine, whether for Stationary, Portable, Marine, Automobile or Aeroplane work. Everything in the Supply and Repair line, for Any Size or Make of Engine. Expert Engineers furnished on short notice. Correspondence, Consultation Free. Agents Wanted.

GAS ENGINE BROKERAGE CO.,

(Dept. A.) Philadelphia Bourse, Philadelphia, Penn.

The A.S.B. TREADS

NO PUNCTURES
SKIDDING
BLOW-OUTS
STONE BRUISES
CHAFING SIDE OF TIRE
FEAR OF RUTTY ROADS
CREEPING ON RUBBER TIRE
MUD CHAINS NEEDED
EXTRA INNER TUBES
RIM CUTTING
FAULTS IN IT

IF CAR IS EQUIPPED WITH
A.S.B. TREADS
WEBSTER CITY IA.

WHEN YOUR
AUTO IS EQUIP-
PED WITH THE
A.S.B. TREADS
ON ALL 4 WHEELS,
YOUR TIRE TROUBLES
ARE ALL OVER.

Queen Manufacturing Company, Box 24, Webster City, Iowa.

We want a few cars fitted with the A. S. B. Treads in every town in the United States for advertising purposes, and for these sample sets we are going to give you a big discount from our price list, which will only go to a very few. But the first one in a city or town to order a full set will get the grand prize discount. See that you are that ONE.

Grand Prize to
Automobile Owners.



THE BUFFALO ELECTRIC VULCANIZER

Will enable you to REPAIR YOUR OWN TIRES.

THREE TIMES THE LIFE.

A NECESSITY FOR EVERY AUTO OWNER.

FREE Send for our Booklet "TIRE TROUBLES," with description of Vulcanizer, to-day.

BUFFALO ELECTRIC VULCANIZER CO.,

BUFFALO, N. Y.

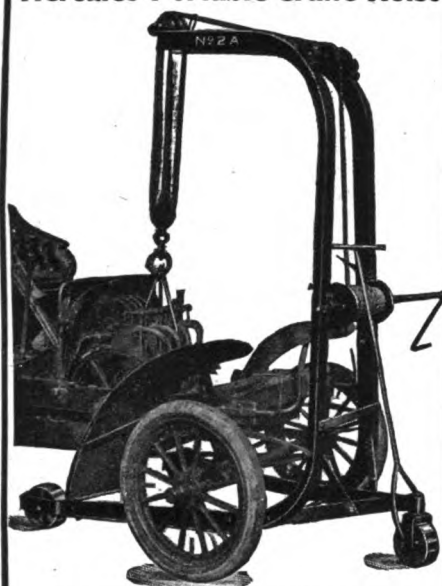
322 ERIE CO. BANK BLDG.,

Thermoid

BRAKE BAND LINING

WEARS INDEFINITELY
SOLD BY ALL FIRST CLASS DEALERS

Manufactured by THERMOID RUBBER CO., Trenton, N. J.

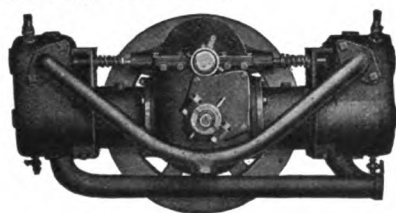
Hercules Portable Crane Hoist

Patented December 19, 1905
See how easy it does it. Fills the bill for Automobile Factory and Garage Crane. Many of them using it. You should. Send for descriptive circular.
WILLIAM S. NICHOLLS, Hoosic Falls, N. Y.

The Beilfuss Double Opposed Motor

Makes a hit wherever used on account of its compactness.

Can be placed in any car from the small Olds Runabout to the larger sized cars.



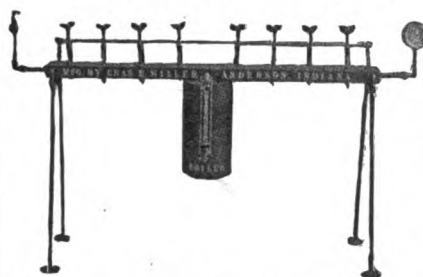
Made in two sizes:
10-12 H. P. and 18-20 H. P.
Water Cooled.

Write to day for Circular and Prices.
Simplest and Strongest Motor Built.

Beilfuss Motor Co.
LANSING, MICH.

Please mention the Auto Dealer and Repairer

MILLER'S INNER TUBE VULCANIZER.



Has a tube plate 54 in. long and 4 in. wide with plain surface highly polished, complete with stand, 12 fine boiler, gas or gasoline burner, water glass, pop valve, steam gauge, 8 clamps and two molds for curing the treads of casings, price \$30.00. Tube plate only with steam gauge and 6 clamps, price \$10.00.

We also manufacture various other vulcanizers. No. 1 and No. 2 adjustable sectional vulcanizers, complete with boiler, \$35.00 each. Bicycle vulcanizers, \$7.50; Motor cycle vulcanizers, \$12.50; Tread Rollers, \$12.00; Kettles, \$115.00; Power wrapping machines, \$175.00 each. Also special round molds with flush joints for splicing inner tubes. We do all kinds of tire repairing and carry a large stock of tires at reasonable prices. If further interested in vulcanizers write for catalog and special proposition.

CHAS. E. MILLER, Anderson, Ind.

Eastern Self-Measuring Pump

Our 1907 Model, shown herewith, will quickly pay for itself in any garage.

**Convenience,
Economy,
Safety.**

Not one drop of Gasoline wasted.

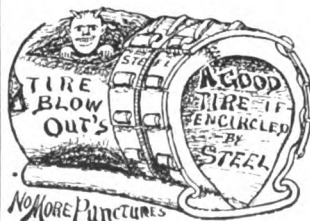
**Gasoline Tanks,
Pumps,
Complete
Storage
Outfits.**

Get full information by writing to



Eastern Oil Tank Co.
Lowell, Mass., U. S. A.

PROTECT YOUR NEW TIRES. REPAIR THE OLD ONES.

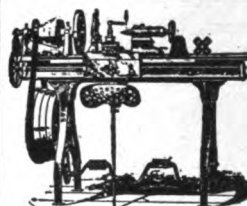


Tires Will Last Forever

Steel Link Bands

Hooks to Rim

You can fix Blowout quick. If tire is completely covered by these clasps you cannot have Blow-outs, Punctures, Rim Cuts or Wearing off of tire. (Any old tire is good. How can it get away if encircled by steel?) As flexible as ever. Anti Skid.
KIMBALL TIRE CASE CO., 174 Broadway, Council Bluffs, Ia.
Agency for Indiana, 417 Mass Ave., Indianapolis.



THE BARNES LATHES

9" swing
11" swing
13" swing

For Repair Work our No. 13 Lathe is right; has 13" swing, auto cross feed, length of beds from 5 to 10 feet long; furnished with counter-shaft or foot-power.

SEND FOR LATHE CATALOG.
W. F. & JOHN BARNES CO.
206 Ruby St., - - - Rockford, Ill.

NEW LEATHER IN YOUR AUTO FOR \$1.00

Enamelac Leather Finish in Five Colors.

Will restore the color and finish, or change the color of leathers and imitation leathers that have become worn, soiled and discolored. Is water-proof. Sufficient amount to refinish the leather in large car for \$1.00.

Ask us for our attractive dealers' proposition

THE ENAMELAC VARNISH COMPANY
108 MAIN STREET RACINE, WISCONSIN.

GASOLINE STORAGE UNDERGROUND OUTFITS

\$12.50, \$25.00, \$35.00 and up.

GOOD GOODS. LOW PRICES.

LUBRICATING OIL TANKS ALSO.

\$3.50, \$5.25, \$6.50, \$10.00 and up.

Cabinets, \$15.75 to \$100.00.

Oily Waste Cans, meeting insurance requirements.

Accurate Measures, and good funnels.

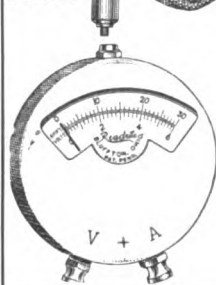
Kamp Kook's Kits that please tourists.

Ask Your Dealer. Send for Catalogue.

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F. CORTEZ WILSON & CO.,
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Sold by
Jobbers
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Dealers



READRITE POCKET METERS

Noted for
**Accuracy, Durability
and Permanency.**

Written guarantee for one year with each meter.

Ammeters, \$2.50

Volt-meters, \$3.00

Volt-ammeters, \$3.50 & \$4.00

Write for Circular and Discount to Trade.

Read-Rite Meter Works
18 Main St., Bluffton, O.

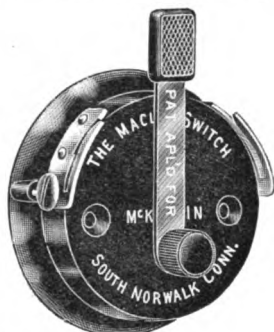
MENDENHALL'S ROAD MAPS

MAPS AND GUIDES FOR AUTOMOBILISTS.

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39 Opera Pl., Cincinnati, O.

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MACLET SWITCH

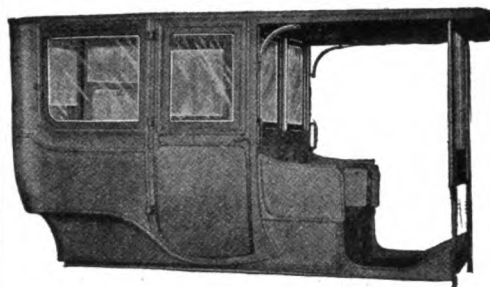


Has a removable lever and at the same time a spring device for keeping the lever off the contacts when the contact is once broken—thus obviating the familiar annoyance of having the lever fall back and make connection after removing it from the contact point.

EACH IN A NEAT BOX
90 Cents

We also manufacture **Maclet Coils**
For Launches or for Automobiles.

GEO. N. MCKIBBIN, Elmwood Ave., near High St., S. Norwalk, Conn.



AUTOMOBILE BODIES.

We are builders of High-Grade Automobile Bodies, in Aluminum, Steel, or Wood Panels.

Limousines, Landaulets, Taxicabs, Touring, or Runabouts. Manufactured in White, or Painted and Trimmed, also Tops for Touring Cars and Runabouts. Get in touch with us at once. Estimates cheerfully furnished. Four years' experience.

SCHUBERT BROS. GEAR CO.,
43 CEDAR ST., ONEIDA, N. Y.

\$1.00

Twin Grip WRENCH



Seven different Wrenches and Screwdriver.

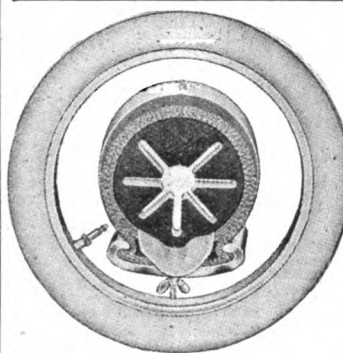
Including Alligator Wrench. A high grade tool made of tempered cast steel, nickel plated. Cannot rust. **MAILED ON RECEIPT OF ONE DOLLAR.** Send for Dealer's Price. Manufactured by

BURKLEY SUPPLY CO., 25 Old Slip, New York.

THE IDEAL AUTOMOBILE TIRE

Is the PNEUMATIC TIRE with the

Brameld Non-Collapsible Inner Tube



These tubes are designed to carry the loaded car when the tires become deflated by punctures or other causes, entirely doing away with all repair work on tires while on the road. No change whatever required in present equipment; simply pull out the collapsing tube and insert **The Brameld Non-Collapsible Tube** in the old casing; and the tire is good until the last layer of fabric is worn through. No stopping—No delays—No worry—Keep a-going. Your tires at all times in running condition—Inflated or deflated. Write today for price list.

The Brameld Non-Collapsible Pneumatic Tire Co.,

Pat. Sept. '08.

22 Hopper Street, Paterson, N. J.

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OXY-ACETYLENE

Broken parts of automobiles and other machines can be welded and made as strong as the original without injury to the metal; cast iron, steels, aluminum, bronze, etc. Automobile engine cylinders, transmission cases, crank cases and shafts, our specialty.

We have a first class machine shop in connection with our welding plant.

We build and install Stationary and Portable Welding Plants. We are Engineers and Designers of Automobiles, Special Machinery, Tools and Dies.

MACHINISTS

ENGINEERS

POLLARD ENGINEERING CO.,
165-169 N. Jefferson Street, Chicago, Ill.



THE POINT SPARK PLUG

Patented June 15, 1909

The Point

Spark Plug is a necessity on all engines that use large quantities of lubricating oil, such as small, rapid engines, air cooled automobiles and motor cycles.

The Point

will give any service that an ordinary plug will—and then some.

GUARANTEE

Any defective Point Spark Plug will be replaced if returned to the manufacturer. Any broken Spark Plug, returned with five cents to the manufacturer will be repaired and returned.

SIZES— $\frac{1}{4}$ inch, Standard A. L. A. M., $\frac{3}{8}$ x 18 and Metric.

PRICES—The Point Spark Plug any size, **\$1.50.**

See us at the Chicago Show, Feb. 5-12,
Space 13, First Regiment Armory.

Manufactured by **THE POINT SPARK PLUG CO.,**
Manufacturers of Motor Accessories,
112 11th Ave., S. E., ABERDEEN, S. D.

Look—\$18.00

KEELER Electric Lighting Storage Battery

For Automobiles.
NON-CORROSIVE. Standard sizes, and prompt attention given to special sizes. Carry full line of Lighting Accessories.

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Keeler Battery Co.,

132 Ontario Street, Toledo, Ohio.



Every Garage and Repair Shop Needs a Cast Iron Brazing Outfit.

It is a good money maker. We supply a complete outfit, or compounds only if you are equipped for brazing. Complete instructions to all purchasers. Write us for full information.

THE A. & J. MANUFACTURING CO.,

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DOW PERFECTED MAGNETO

High Tension Arc Flame Alternating Current Ignition. Used on any car, will afford Greater Power on Less Fuel, Cleaner Cylinders and Smoother Running.

Sold to any responsible person on

THIRTY DAYS' TRIAL

Any Dow Magneto will give perfect service indefinitely with no other attention than a few drops of oil every two or three thousand miles.

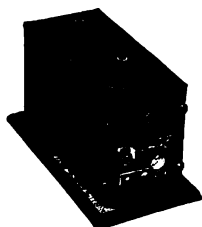
Write for practical high tension ignition facts.

DOW MANUFACTURING CO., Braintree, Mass.

Try Dixon's Motor Graphite

Just try it once and see how much easier, smoother and more quietly your car will run. Dixon's Graphite saves time and trouble. Write for free sample, G-184.

Joseph Dixon Crucible Company,
JERSEY CITY, N. J.



CARTRIDGE EASY REPAIR COILS.

Are you up against coil repair troubles? Then you will appreciate the **Easy Repair** feature of Cartridge Coils. All Cartridge Types are equipped the same way and all are **easy to repair**.

Write for our Special 30 Day Offer.

CARTRIDGE COIL COMPANY,
LAFAYETTE, IND.

Auto Directories Co., Inc.

CERTIFIED COPIES OF THE OFFICIAL LIST OF AUTO OWNERS, CHAUFFEURS, DEALERS, GARAGES, MANUFACTURERS AND JOBBERS IN THE U. S. AND CANADA. ALSO MOTOR BOAT OWNERS

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NEW YORK CITY

'Phone 858 Columbus.

C. O. T. TIRE PATCHES



Mr. Dealer and Owner Have you ever thought that to make a good repair you have got to have the correct article? You can get it in our Patches. They are made to absorb the cement, and have a heavy center and feather edge. Can be obtained from all jobbers.

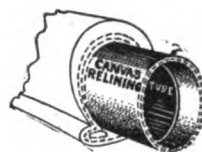
C. O. TINGLEY & CO.,
RAHWAY, N. J.

THE "INNERSHU"

MAKES YOUR TIRES LAST TWICE AS LONG.

Puncture Proof.

Prevents Blowouts.



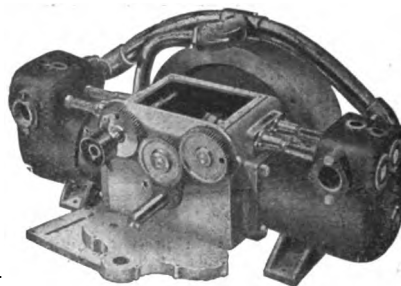
Easily Applied.

Not Expensive.

The Only Scientific Method to Double Tire Durability.

ASK YOUR DEALER OR WRITE

INNER SHOE TIRE CO.
Grand Rapids, Michigan.



BRENNAN MOTORS

Quietest and Smoothest

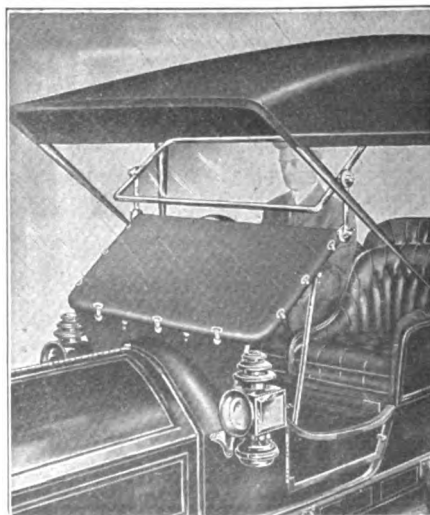
running on the market. Cut shows our two cylinder horizontal opposed style, made in sizes indicated. We also make four cylinder and six cylinder vertical motors. We can furnish our motors mounted complete with transmission gears on sub-frame to fit all standard makes of cars.

Write for full particulars and Catalogue.

Brennan Motor Mfg. Co.,
Syracuse, N. Y.

3 cylinder, horizontal opposed, 4 9-16x5 annular ball bearings.
3 cylinder, horizontal opposed, 5 1-2x5 annular ball bearings.
3 cylinder, horizontal opposed, 5 1-2x5 annular ball bearings.
3 cylinder, 4x4, 4 3-16x5, 5 1-2x5 and 6 1-2x7.
4 cylinder, 4x4.
4 cylinder, vertical, 4 9-16x4. 4 cylinder, vertical, 4 9-16x5.
4 cylinder, vertical, 4 9-16x5. 4 cylinder, vertical, 4 9-16x5.
4 cylinder, vertical, 5 1-2x5. Four and six cylinder shafts to order.

We also make a specialty of Transmission Gears.



VANGUARD Zig-Zag Shield.

Weights 23 lbs., is 42 inches wide and will fit any car.

Standard Equipment Silk Mohair or Pantasote curtain, \$40.00. Black pebble grained leather, lined with blue or tan whipcord, \$5.00 net, extra.

Discount to dealers on request.

Chicago Branch, 1427 Mich. Ave.

VANGUARD MFG. CO.,
Dept. "G."
Joliet, Ill.

**The Only Sane,
Safe and Sure
Motor Shoe
Protector---Not a
Tread Protector,
but a Tire
Protector.**

**Made of Steel---
No Leather to
Come unglued or
Stretch out of its Rivets, or Burn the Rubber Beneath it.**



(a.) Our patented supplementary Anti-Skid Treads made of glass-hard steel will wear five thousand to ten thousand miles, and when worn off may be replaced with new ones at a cost of ten cents each.

(b.) Main tread plate made of chrome nickel steel with all edges turned away from the rubber. Cannot wear out as it does not come in contact with the road surface.

(c.) Link-plates made of best chrome nickel steel.

(d.) Our patented rim locks that attach themselves with absolute security to the rim.

(e.) Strongest open Hearth Steel links that hold all parts securely together, making 880 smoothly sliding joints, or hinges, that retain the entire resiliency of the tire, yet do not wear, from the fact that the weight of the car loosens or OPENS instead of bringing pressure upon them.

Place this on your weak, worn tire, and you will find the combination gives you the best motor shoe on the market. The perfect resiliency of the pneumatic shoe remains, but the mileage is greatly multiplied, and the inconvenience of tire troubles is gone—in fact YOUR OLD SHOE WILL NOW OUTLAST ANY THREE NEW ONES. SOLD UNDER AN IRON-CLAD GUARANTEE.

PREPARE NOW FOR SPRING WORK.

Those who do not use their cars in winter, will not only find this an IDEAL time to have their tires fitted with DAVIS ARMORS, but they will then be INSURED ABSOLUTELY against the inevitable bursting and early destruction of their tires, which USUALLY occurs when they are put back into service in the spring, after a winter in a cold barn. Rubber is extremely susceptible to freezing, and soon loses its life when so exposed, and

TIRES COST MONEY NOW.

THE DAVIS ROBE CO. (Inc.)

Champlain Bldg., Chicago, Ill.

DAVIS ROBE CO., Champlain Bldg., Chicago, Ill.

Send immediately your book of "Questions and Answers," and your SPECIAL INTRODUCTORY OFFER. I have not seen your tire protectors ON A CAR here.

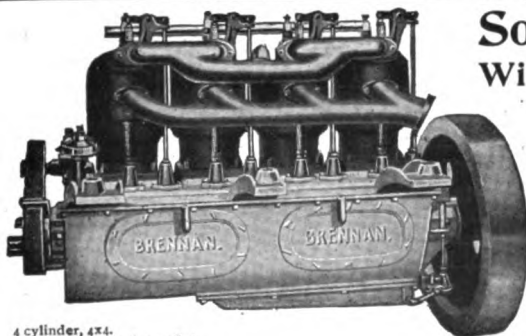
My Car is a..... H. P.....
using.....tires and.....rims.

Size of tire.....X.....

Name.....

Address.....

A. D. & E.



4 cylinder, 4x4.
4 cylinder, vertical, 4 9-16x4.
4 cylinder, vertical, 4 9-16x5.
4 cylinder, vertical, 5x5.
4 cylinder, vertical, 5 1-2x6.

4 cylinder, vertical, 6x6.
6 cylinder, vertical, 4 9-16x5.
Four and six cylinder chassis to order.

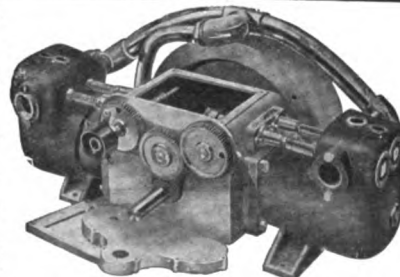
BRENNAN MOTORS are guaranteed to wear longer and to give more service than any other motor and the price is right. Let us tell you about them.

**Something Wrong
With Your Car? Perhaps it
Needs a New Motor**

We build the quietest and Smoothest Running Motor on the market.

BRENNAN MOTORS

Have stood every test for reliability and have proved themselves **par excellence**. YOU CAN HAVE ONE on your car for they can be furnished mounted complete with transmission gears on sub-frame to fit all standard makes of cars, such as Aerocar, Olds, Pope-Hartford, Cadillac, Wayne, Queen, Ford, Marion, etc. The Brennan Motors are the quietest and smoothest running on the market.



3 cylinder, horizontal opposed, 4 9-16x5 annular ball bearings.

3 cylinder, horizontal opposed, 5x5 annular ball bearings.

3 cylinder, horizontal opposed, 5 1-2x5 annular ball bearings.

3 cylinder, 4x4, 4 3-16x5, 5 1-2x6 and 6 1-2x7.

We manufacture MOTORS and TRANSMISSION GEARS.

Write for full particulars.

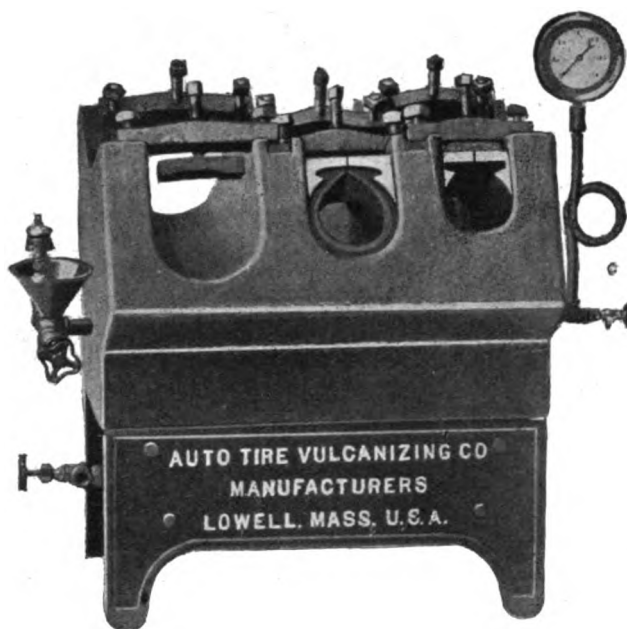
BRENNAN MOTOR CO., Syracuse, N. Y.

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AUTO TIRE REPAIR OUTFITS

Our Latest Production and Leader for 1910

The illustration represents our No. 8 New Improved Adjustable Sectional Vulcanizer. This vulcanizer has three cavities. With it you can cure any casing that is made, either Foreign or American make, from 3 in. to 5½ in. of all the various makes of Clincher type, Quick Detachable, Goodyear or Dunlop style and others, also Fisk bolted on type.

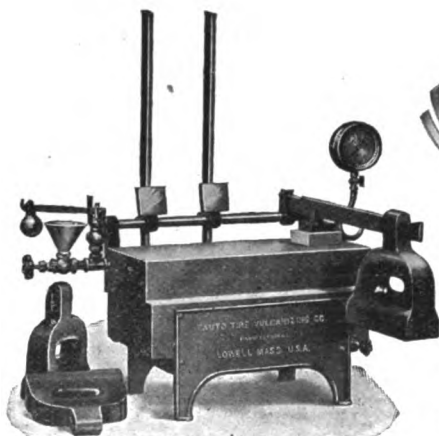


No. 8 New Improved Adjustable Sectional Vulcanizer

This vulcanizer is provided with thirteen sets of bead moulds for the various makes of tires. It also has steam gauge, pop safety valve, globe valve, filler, gas burner and valve, and six clamps for clamping the bead moulds in place.

This vulcanizer is steam jacketed and like other vulcanizers of our own make, is in one piece having no packed or bolted joints, thus avoiding the possibility of leaks. The vulcanizer is very compact, it occupies a space only 27 in. long and 21 in. wide.

The vulcanizer can be furnished with gas or gasoline burner to generate its own steam, or it can be furnished to connect direct to steam boiler.

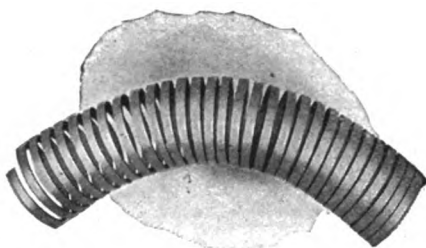


No. 2 Vulcanizer

Weight, 275 lbs.

This Vulcanizer is manufactured especially for repairing the inner tubes of double tires. With it incisions or breaks up to the extent of 20 inches in length can be perfectly repaired.

By its use in connection with the No. 8 Vulcanizer every repair needed on tires can be completed in the most satisfactory manner.

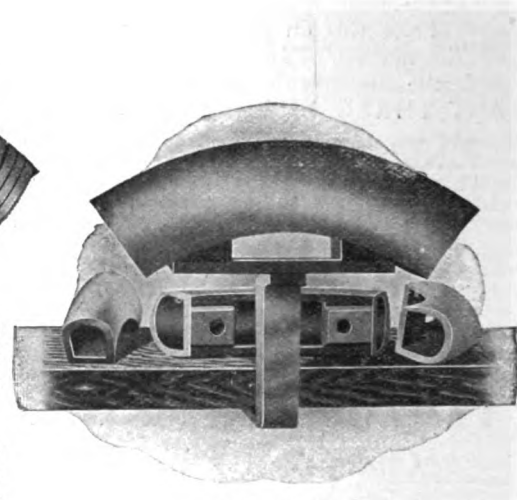


COILS

The above cut shows a section of a flat wire coil which is used to take the place of air bags in the re-treading of tires.

These coils are made of bright, hard rolled, flat steel wire, ⅜ inch wide, and are so wound that they may be opened or closed to fit tires of different diameter.

They are made in seven sizes, from 2½ to 6 inches, and being made of flat wire it leaves the inside of the casing perfectly smooth, overcoming the objectionable feature of round wire coils.



CORES

This illustration shows a set of four cores which are designed to hold casings while in process of repair. These cores are of heavy cast iron, and are practically indestructible, holding casings from 2½ to 5½ inches, and are interchangeable.

They are placed on a heavy wrought iron stand which is bolted to the bench. They are a necessity in every repair shop, and easily pay for themselves in a short time in the saving of labor. Weight, 85 lbs.

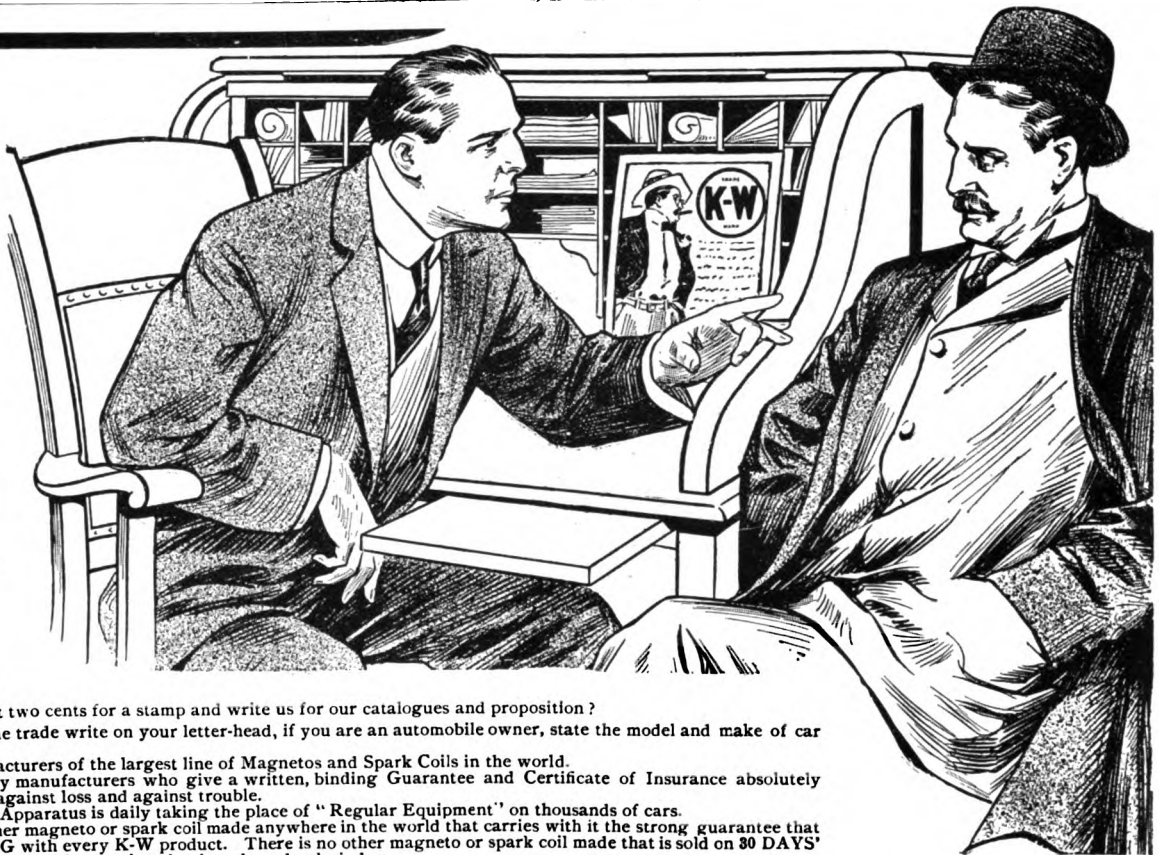
WRITE FOR NEW DESCRIPTIVE CATALOG AND PRICES.

**AUTO TIRE VULCANIZING CO.,
LOWELL, MASS.**

Please mention the Automobile Dealer and Repairer when writing to advertisers.

WE WANT
TO HEAR
FROM
YOU

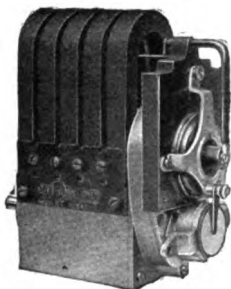
Mr. Dealer,
Mr. Repair
Man, and
Mr. Automobile
Owner.



Will you invest two cents for a stamp and write us for our catalogues and proposition?
If you are in the trade write on your letter-head, if you are an automobile owner, state the model and make of car you are driving.
We are manufacturers of the largest line of Magnetos and Spark Coils in the world.
We are the only manufacturers who give a written, binding Guarantee and Certificate of Insurance absolutely protecting the user against loss and against trouble.
K-W Ignition Apparatus is daily taking the place of "Regular Equipment" on thousands of cars.
There is no other magneto or spark coil made anywhere in the world that carries with it the strong guarantee that is given in WRITING with every K-W product. There is no other magneto or spark coil made that is sold on 30 DAYS' FREE TRIAL and where the user is to be the sole and only judge.
Have you stopped to consider these facts seriously?

THE K-W HIGH TENSION MAGNETO.

The K-W High Tension Magneto generates four waves per revolution of the magneto and produces an arc flame
"AS FIERCE AS LIGHTNING—AS SURE AS DEATH."



Model H. T.
High Tension.

Has no fibre parts or contacts to swell up and give trouble. Breaker cam is of hardened tool steel. Circuit breaker is extremely light, quick acting and positive, and can be adjusted or entirely removed and replaced **without tools of any kind.**

Every K-W Magneto is guaranteed to retain its magnetism **forever**, unless battery current is run through it. The size and volume of the spark will **never** deteriorate.

The K-W High Tension Magneto is guaranteed to start the heaviest engine on the quarter turn without batteries, as it gives a fat spark on 17 R. P. M. Will positively shoot a poorer and thinner mixture than can be ignited by the most powerful battery system.

Will develop **more power** than any battery system or other magneto, and engine can be throttled down to from $3\frac{1}{2}$ to 4 miles per hour on high gear.

Requires no spark coil or timer as it is a complete ignition system in itself. Must be gear driven.

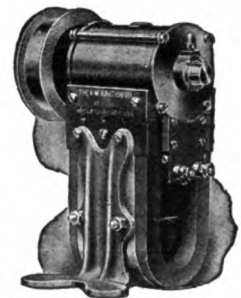
The magnets are guaranteed to retain their magnetism **FOREVER** unless battery current is run through them, or they are removed from the magneto, and the heat and volume of the flame **NEVER** to deteriorate.

All bearings are of the highest grade imported ball and even the distributor is carried in them.

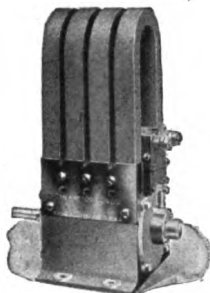
Castings are of BRASS machined with special tools to the extreme of accuracy. No die castings of "pewter" or "cast iron" on the K-W. All wearing parts are of chrome steel.

Circuit breaker parts are very large and massive and are of the famous "Platino-Iridium," thus assuring many thousands of miles without adjusting. All parts are interchangeable.

Write for descriptive literature and prices.



Model F.



Model A.
Low Tension.

THE K-W LOW TENSION MAGNETO

To be used with spark coil and timer and operated from fly-wheel by belt or friction drive.

The K-W Low Tension Magneto when used in connection with either a K-W Spark Coil or Master Vibrator is absolutely guaranteed to start the heaviest engine on a quarter turn of the crank, run it faster, smoother and **AT ALL SPEEDS WITHOUT MISSING.**

To develop more power on a weaker mixture than by any other means. Magnets are guaranteed to hold their power **FOREVER** (unless battery current is run through them).

Entirely eliminates the use of batteries, and if one of our "L" models, will furnish **IN ADDITION TO IGNITION**

POWERFUL ELECTRIC SEARCHLIGHTS.

Made in many models for every make of car. Write for Bulletin 12 and Copy of Guarantee.

THE K-W SPARK COIL.

The only spark coil made which is guaranteed for over **ONE YEAR.**

Don't purchase a spark coil which the manufacturer is afraid to guarantee. He knows what it is made of and if **HE** is afraid of it **YOU** should be also.

The K-W Spark Coil is guaranteed

FOREVER

against breaking down, burning out or short circuiting, and any coil will be replaced **FREE OF CHARGE AT ANY TIME** if it fails you.

Pretty good protection, isn't it? Write for coil circular and copy of guarantee. They will open your eyes.

To every one answering this advertisement during February we will make a special offer, to be taken advantage of any time during 1910, of **SIX** of the famous K-W Spark Plugs for \$4.00, including a **SPARK PLUG CARRYING CASE—FREE.** The regular price of these plugs has always been One Dollar each, **WITHOUT CASE.** Don't delay—write to-day. This offer is special and simply to get our catalogue in your hands. Do It Now!!



The K-W Spark Coil.



37 POWER AVENUE,
CLEVELAND, OHIO, U. S. A.

To The Man Who Uses or Sells Auto Tools

Buffum Tools for automobile work represent in their design the best ideas of the most expert mechanics.

Some little mistake in a detail of the design of a tool, makes *all the difference in the World*. Buffum tools are *right*. We know that, for several very good reasons. One indication is the increasing demand from places where we have already sold large quantities.

These tools in range cover *all* operations in auto construction and repair.

Buffum tools are known to give the best results and service. The name "Buffum" guarantees the *grade* of the tool. High grade workmen *insist* on having Buffum tools.

Get the Buffum Catalog

Just fill out the coupon below, enclose it in an envelope and send it to us and we will forward you by return mail our catalog of automobile tools.

This catalog is *very good* for reference whenever you are in the market for tools, as it is complete as to description and well illustrated. We desire to place one in the hands of every mechanic and every purchasing agent in the automobile field. It is strong on—

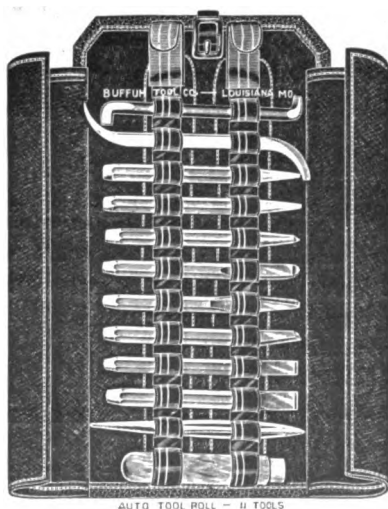
Chisels of all types, Punches, Screwdrivers, Cotter Pin Tools, Auto Bearing Scrapers, Bearing Scraper Sets, Tool Sets in fine variety, Gad, Lip and Tap Tongs, Removing Tools, Packing Irons, Carbon Scraper Sets, Off-Set Screwdrivers, Pin Punches, Blunt End Cold Chisels and Calking Irons.

No tool leaves our factory without undergoing *careful* inspection. The Buffum standard of excellence is extended to *every* item of our production. You can order from us understanding that we stand behind our goods.

All leading dealers sell Buffum Tools. Write now for the catalog.

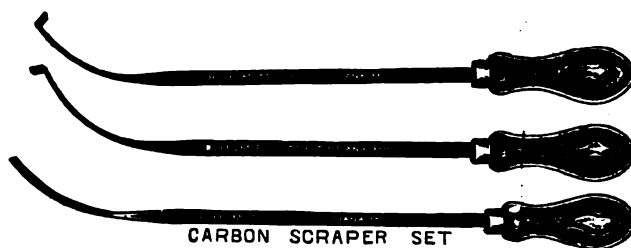
BUFFUM TOOL CO., Louisiana, Mo.

C. S. LAWRENCE, Eastern Sales Agent,
117 Chambers Street, Telephone, 2063 Worth.



Automobile Tool Roll.

Twelve High-Grade Tools in Roll of Imitation Leather, Cloth Lined.....\$3.50
This is a famous value. The set takes care of most work arising in general automobile repairing. It includes one Special Pin Punch, one Plain Punch, one Center Punch, one Diamond Point Chisel, one Round Nose Chisel, two Flat Cold Chisels, one Bearing Scraper, one Offset Screwdriver, one Cotter Pin Tool and one Tool Handle.



Standard Carbon Scraper Set.

Specially made to scrape carbon from tops of cylinders and pistons and the exhaust parts of gas and gasoline engines. Carbon on inside of cylinders causes pre-ignition and engine to overheat, while carbon in exhaust parts reduces power often over one-half. Price of set of three pieces packed in a pasteboard box.....\$1.00

SPECIAL COUPON—FILL OUT AND MAIL.

BUFFUM TOOL COMPANY,
Louisiana, Mo.

Gentlemen:—Kindly send me catalog 1, Section A, showing auto tools and tool sets.

Name.....

Occupation.....

I buy my tools from.....

Address.....

Town and State.....



MR. DEALER : Just a word with you regarding your policy for 1910. What will it be? Will you elect to handle honest goods at an honest price, thereby earning a reputation for square dealing and assuring you of substantial future profits, or will you choose the opposite course, buy inferior imitations at cut rate prices and sell them for what they are **not**, thereby risking your reputation, and have the disappointment of seeing your profits fade away like a fog bank before the sun?

Supposing you can buy an imitation, which has every appearance of being genuine, for ten cents less than the article imitated, what better off are you when some cut rate supply house can sell the same thing to your customer at ten cents less than you can buy it for? But supposing you do get the customer nailed before the cut rate supply house man gets around and you make the sale, getting the price of the genuine article ; later your customer finds that you have sold him an imitation which he could have bought elsewhere for 25% less than you charged him, where do you stand?

The line of Hoyt pocket meters is acknowledged to be the leaders in their class. They are the result of five years of development. They are made in a factory designed for, and devoted exclusively to the manufacture of electrical measuring instruments, under the supervision of men who for twenty years have made a special study of the subject. **More than sixty thousand of these meters were made and sold in the year 1909 alone.** Approximately two hundred thousand have been made and sold in the five years that they have been on the market. Eloquent testimony surely to their sterling merit. More eloquent still are the volumes of unsolicited testimonials in our files, like the following from the Tampa Cycle and Auto Supply Company :

"Replying to your letter of Jan. 20, we beg to state that we have quite a number of ammeters on hand at the present time of several makes, but as I believe the Hoyt to be the best, shall endeavor to handle them exclusively."

The most eloquent tribute of all, however, is the attempt of other manufacturers to market meters as near like the Hoyt in appearance (appearance is all they can imitate, they cannot imitate the quality) as they can make them. Even to copying the design of the case, the color of the cables, the color of the paper on the box and the general appearance of the meter. Did anyone ever imitate a poor article?

Notwithstanding their high quality, however, Hoyt meters sell at the same price as the manufacturers pretend to sell their imitations. The difference being that Hoyt meters are maintained at an established price, while the imitations are not. You will not find Hoyt meters pushed by cut rate supply houses, because we have steadfastly refused to put them in a position to interfere with the legitimate trade, although we could have disposed of thousands of meters through such channels, had we felt disposed to consider their propositions. How many other manufacturers can say this?

There are five substantial reasons why you should handle Hoyt meters in preference to other makes.

First: Quality. They stand pre-eminently at the head in their class.

Second: Reputation. Their reputation for quality is such that experienced users invariably ask for them.

Third: They are the most widely advertised meter on the market to-day.

Fourth: Square dealing. In the five years that this business has been established, we have earned a reputation for square dealing that we are justly proud of, and it is dearer to us than dollars. Every Hoyt meter sent out has our reputation behind it, and if one proves defective it is made good at our expense, regardless of cost.

Fifth: Last but not least is the matter of price. Our price schedule is arranged on a basis that is equitably fair alike to the user, the dealer and the manufacturer, and our scale of prices is jealously maintained. Every dealer handling Hoyt meters knows that he is getting as good price as his competitor. He knows that if he stocks with Hoyt meters his stock is a salable one, and that cut rate houses cannot detract from its value by supplying his customers with the same meters at prices lower than he himself can buy for.

These designs ~~are~~ ~~are~~ are devised for mutual protection and serve to distinguish the real from the counterfeit. See that your meters bear them. They are synonymous with the "sterling" mark on silver.

HOYT ELECTRICAL INSTRUMENT WORKS,

PENACOOK, N. H.

SALES OFFICES

161 Summer St., Boston, Mass.

136 Liberty St., New York

80 Michigan Ave., Chicago

Please mention the Automobile Dealer and Repairer when writing to advertisers.

DELCO IGNITION

WHY YOU SHOULD HAVE IT ON YOUR CAR

Delco Ignition was designed for the man who wants comfort in motoring; who has no desire to be called upon continually to adjust any part of the car. With Delco on your car the ignition problem is solved for you; it has been worked out by experts in our laboratories, and you do not have to **guess** what its action will be.

SOME BIG DELCO ADVANTAGES:

1. No coil box on the dash, giving your car an up-to-date appearance.
2. No switch troubles, because the Delco switch is the best ever placed on automobiles.
3. Six dry cells will run your car 2,000 miles or more. The system can be operated with storage battery if desired. The only change is one of adjustment, which is made in our factory.
4. Delco systems are properly adjusted before delivery to you, and need not be adjusted again until you have run your car on this system TEN THOUSAND MILES.
5. No sparking at timer or at contact points. Nine-tenths of your timer troubles are eliminated by this one Delco improvement.
6. No vibrators on coils; no master vibrator.
7. Delco will give you more speed, and better control at extremes of low and high speed than you have ever had.

Delco systems are made in the best equipped factory ever used for ignition manufacture. Every detail of their construction is in charge of experts and every part is made a little better than seems necessary. You get the benefit.

Our new 1910 Catalogue gives detailed description of the system. Mail coupon to-day and you will receive it by return mail.

THE DAYTON ENGINEERING LABORATORIES CO.

DAYTON, OHIO, U. S. A.

**DELCO,
Dayton, O.**

Mail 1910 Catalog to

Name.....

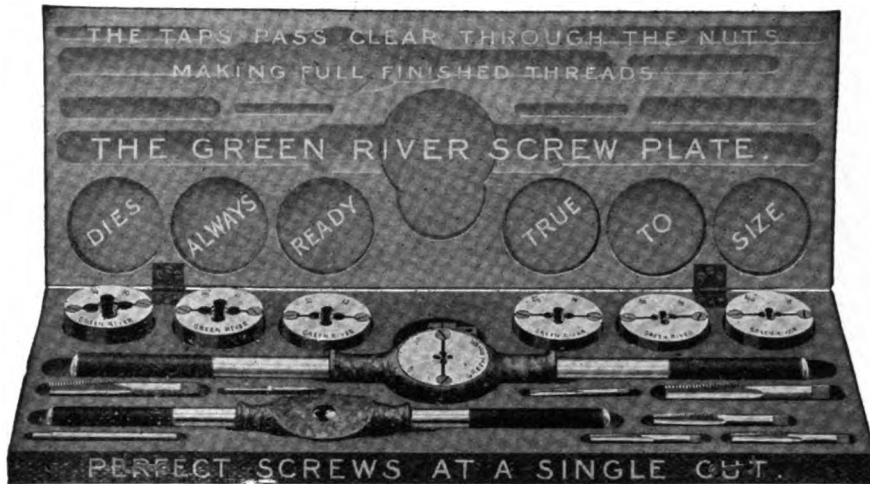
Address.....

Kind of Car Used.....

A. D. & R. Feb.

Please mention the Automobile Dealer and Repairer when writing to advertisers.

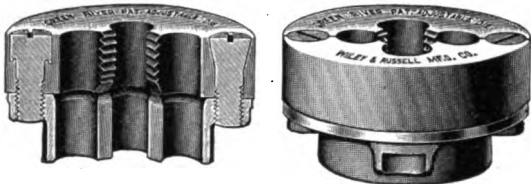
GREEN RIVER SCREW PLATES



For
Automobile
Use

A. L. A. M. Std.

Carried in Stock



Cuts showing mechanism of dies.

Perfect adjustment with one taper screw.

Can be adjusted without removing from stock.

Dies in two parts—can be ground when dull.



**Lightning
“Machine Relieved”
Taps**

Durable—Accurate—Uniform.

A. L. A. M. Std. always in stock.

Used by the largest
manufacturers of automobiles.



**Green River “Spiral Fluted”
Taper Pin Reamers**

Spiral fluted reamers do not chatter. They cut
smooth and true. All sizes, No. 0 to 14 in stock.

Send for Catalogue 34-F and Prices. Ask your dealer for them.

SOLE MAKERS,

WILEY & RUSSELL MFG. CO., Greenfield, Mass., U. S. A.

This Man Clears \$10.00 A Day

WITH THIS

SHALER

ELECTRIC

VULCANIZER

He makes an average of five casing blow-out repairs a day. Each one costs him about 75c. and he gets \$3.00 for it; a profit of \$2.25.

Such enormous returns have been made possible, only by the Type C Shaler.

To repair a blow-out it is not necessary to cut away any good rubber. This is the first saving.

It is not necessary to cut away or "step down" any good fabric. This is the second saving.

The heat is applied to the inside of the tire, right against the new fabric. On account of the enormous pressure exerted by screwing up the three clamps (shown in the illustration) the tape is bound around the tire with so much force as to weld the new fabric into the old. The repaired part is really made stronger than any other part of the tire.

Doing away with cutting away the rubber and fabric makes the work perfectly simple, and as the heat on the vulcanizer is automatically regulated, any helper in your garage can do the work; you don't need an expert tire man. It will mean a great big addition to your daily profits.

Cut out the coupon at once and send to us for full particulars of this money-making appliance.

C. A. SHALER CO., Mfrs.,

Box X,
Waupun, Wis., U. S. A.



C. A.
SHALER
CO.,

Waupun, Wis.,
Box X.

Send free copy of
Garage Hand-book with
description of and best dis-
counts on SHALER ELEC-
TRIC VULCANIZERS.

We have

Alternating Current ☐

Direct Current ☐

No Current ☐

Check your current.

Name.....

Address.....

Please mention the Automobile Dealer and Repairer when writing to advertisers.

A Good Looking Business Motor-Wagon

AND AS GOOD AS IT LOOKS

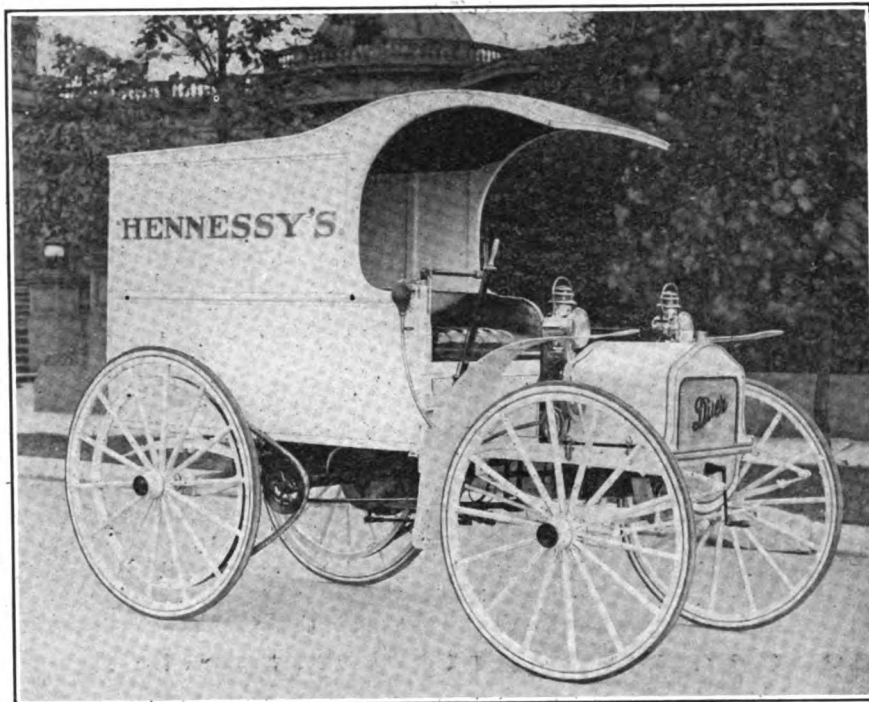
16 H. P.

Capacity
1000 to 1500
lbs.

Weight of Car
1500 lbs.

The
"DUER"
line is a
WINNER

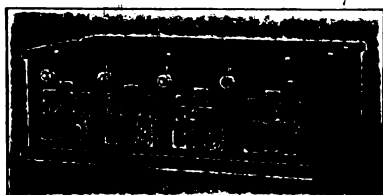
Send for
Dealers'
Discounts



Price
\$900
F.O.B. Chicago

Send for
Complete
Catalog of
Business
and Pleasure
Vehicles

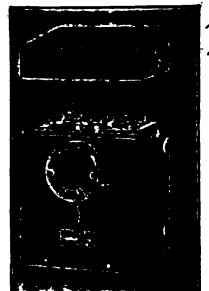
CHICAGO COACH & CARRIAGE CO., 1223 Michigan Ave., Chicago, Ill.



**SCHUG
Electrical
Specialties**



Are the
World's Best
by Every Test.



SPECIAL PRICES TO THE TRADE.

WRITE TO-DAY FOR CATALOGUE.

SCHUG ELECTRIC MFG. CO., DETROIT, MICH., U. S. A. 326 E. JEFF.

SEATTLE MARINE SUPPLY CO., Seattle, Wash., Pacific Coast Agents.

"Akron" Repair Kit

Makes the repair permanent, as it produces the same effect as vulcanization. The acid cures the cement to the rubber or part to be repaired, which makes it one solid piece of rubber and impossible to separate.



"Akron" Repair Kit
Price, Delivered, \$1.00

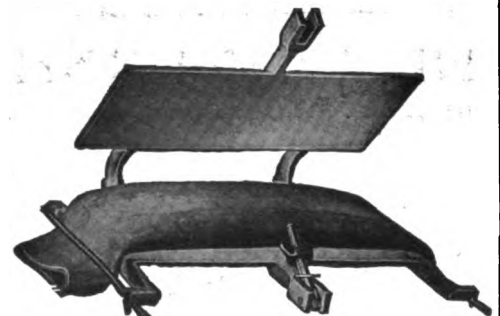
This Pure Aluminum Vise is intended to be used in applying patches to inner tubes. It holds the patches firmly in place while the rubber cement is setting and vulcanizing.

It prevents the patch edges from curling and positively assures you of a permanent repair to your inner tube. For use with any size inner tube. Small, light and strong. An absolute necessity for every automobile owner.

We also make the

"Akron" Inside Repair Patch.
"Akron" Tire Boot,
Motor Cycle Boots and Patches,
Top Dressing for Autos.

Ask your dealer, or write direct. We make regular inner tube patches, six sizes.

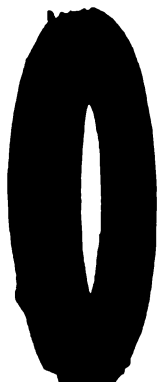


"Hold Tight" Aluminum Vise
For Inner Tube Patching,
Price, Delivered, \$1.25

THE EMPIRE MANUFACTURING COMPANY, 20 Beech St., Akron, Ohio

Please mention the Automobile Dealer and Repairer when writing to advertisers.

Lengthen the Life of Your Tires.



BEFORE

GET 5,000 to 10,000 miles more running out of your old tire casings by letting us triple tread them. No matter how worn or ragged they are, we can, at small cost make them equal to new. They will be Puncture Proof; Non-Skidding. They will run thousands of miles with



A sectional view of Casing which has been triple treaded. Note the layer of rubber which protects the inner casing and the outer covering of rubberized leather with the anti-skid steel studs on.

never a puncture or a blow-out.

Using the original casing as a foundation we build up practically a new tire. A heavy coat of *new* rubber of graduated thickness is first applied to the old casing. This is entirely covered with the best water-proofed French Chrome Leather which has been rubberized by our own special process.



AFTER

The fibres of the leather are thoroughly permeated with the elasticity of the rubber. It has the appearance and resiliency of rubber combined with the toughness and wear-resisting qualities of the best and most durable leather.

And just at the point where the most wear comes we add a third thickness of the rubberized leather. This is studded with from three to six rows of hardened steel studs (according to the size of the casing), this making a practically skid-proof "new tire."

By bringing your old tires to us to be triple-treaded, you can cut your tire bills in half. The cost of triple-treading is small—less than the price of an inferior new tire—hardly more than a rubber retread. Don't buy new tires, send the old ones to us. Anyway ask us for further details of this form of tire economy.

TRIPLE-TREAD AUTO TIRE MFG. CO.

1543 Michigan Avenue, Chicago, Ill.

TELEPHONE CALUMET 2456



BETTER CONTROL

FIT YOUR BUICK NO. 10 WITH THE F-B. AUTOMATIC CLUTCH RELEASER AND AVOID ACCIDENTS. :: :: ::



The above cut shows the F-B. Automatic Clutch Releaser in use; better control, no stooping for lever, a clear view at all times.

This cut shows the old way of releasing clutch; cramped position, time lost in reaching for lever, and imperfect view ahead.

The F-B Automatic Clutch Releaser interlocks the service brake and high speed clutch; or it may be used to interlock the high and low speed clutches. Pressure on the brake disengages the high, further pressure applying the brake; when foot is released, the clutch re-engages. Pressure on the low speed clutch disengages the high, further pressure applying the low; when foot is released, high re-engages. Descriptive circular giving further particulars and naming the price will be sent to any reader writing for it.

THE F-B. COMPANY, 1207 Lady Street, Columbia, S. C.
Hyman Brothers, Drawer C, Greenwood, Miss., General Agents for Ala., Ark., Ga., La., Miss., Mo., and Tenn.



SATISFACTION

is what you get if you use

VANGUARD SPARK PLUGS

This plug was originated by two of the foremost ignition experts of this country and is constructed of only first-class material. Porcelain is especially selected and treated for this plug. Can be cleaned, if necessary, in a jiffy by anyone. No experience required. Delivers nothing but full-grown sparks. Price, all threads, \$1.00.

For Sale By All First Class Jobbers and Dealers

CHICAGO BRANCH, 1427 MICHIGAN AVE.
VANGUARD MFG. CO.

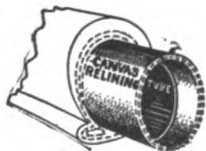
Dept. G., JOLIET, ILL.

THE "INNERSHU"

MAKES YOUR TIRES LAST TWICE AS LONG.

Puncture Proof.

Prevents Blowouts.



Easily Applied.

Not Expensive.

The Only Scientific Method to Double Tire Durability.

ASK YOUR DEALER OR WRITE

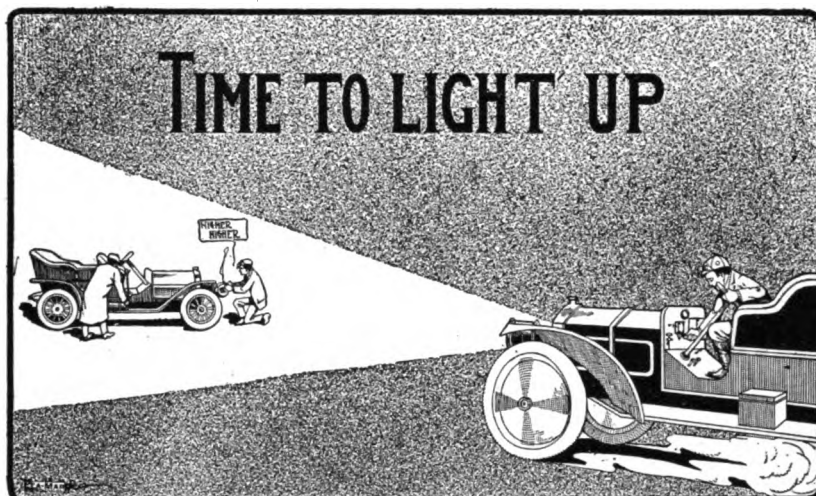
INNER SHOE TIRE CO.

Grand Rapids, Michigan.

Try Dixon's Motor Graphite

Just try it once and see how much easier, smoother and more quietly your car will run. Dixon's Graphite saves time and trouble. Write for free sample, G-184.

Joseph Dixon Crucible Company,
JERSEY CITY, N. J.



THE OLD WAY

THE INST LIGHTER WAY

GET THE INST LIGHTER.

A delightful convenience—used with a gas tank—no adjustment of gas. Saves its cost in gas in less than one season. You take no chances in buying an Inst Lighter. Send \$15.00 direct for a complete outfit, have it installed on your car, and at the end of 30 days if you are not satisfied, return it to us and we will refund your money. Fully Guaranteed.

To light gas headlights, all you have to do is: open the controller at A, and press button B. Adjustment is constant at C.

SEND FOR CIRCULAR.

THE INST LIGHTER CO., COLUMBUS, O.

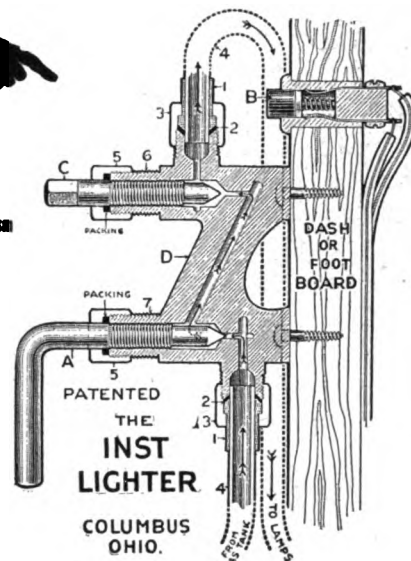
LIGHT

Your gas lamps instantly, conveniently, by turning a gas cock and pushing a button, both located on the dash of your car, where you can reach them without stopping or

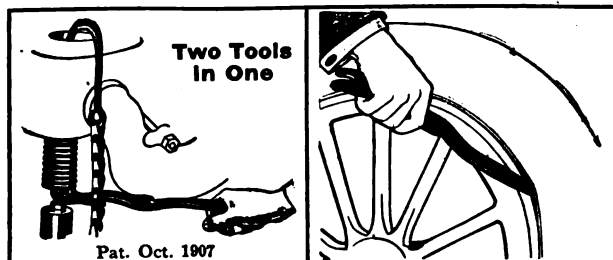
GETTING OUT



Note the Simple, Effective Mechanism

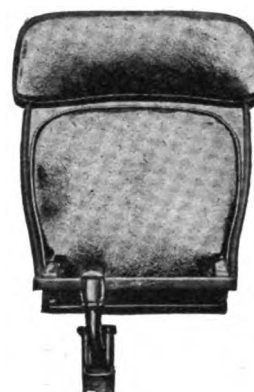


THE IMPROVED Flexible Valve Remover and Tire Tool



Handle end now forms a perfect tire tool. Dealers' price on request. Retails for \$1.50—no advance in price.

THE FLEXIBLE VALVE REMOVER CO.
Successors to Sam. B. White Co. 12 Beverly St., Providence, R. I.



Type C. Seat Folded.

"Luxury" Auxiliary Seats.

Type C. The leading auxiliary seat for 1910-1911. Fully covered by patents.

Each seat rotates freely on its own bracket. Instantly detachable. No disfiguring parts left in car. Most convenient, comfortable auxiliary seats ever made for Automobiles.

Send for our prices. Get our special offers to manufacturers and dealers.

GRAVES & CONGDON CO.

Amesbury, Mass.

EVERY GARAGE AND REPAIR SHOP NEEDS A CAST IRON BRAZING OUTFIT.

IT IS A GOOD MONEY MAKER.

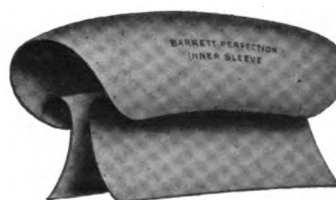
We supply a complete outfit, or compounds only if you are equipped for brazing. Complete instructions free to all purchasers. Write us for full information to-day and learn why it is a good money maker.

The A. & J. Manufacturing Co.,
421 W. Randolph Street, CHICAGO, ILL.

Do Your Own Repairing The Barrett Perfection Inner Sleeve

What is it?

What is it for?



We strip the rubber off and use the fabric. Nothing better made at any price. You cannot afford to be without it. Will mail this sleeve to any address on receipt of price. If not satisfactory return and get your money back.

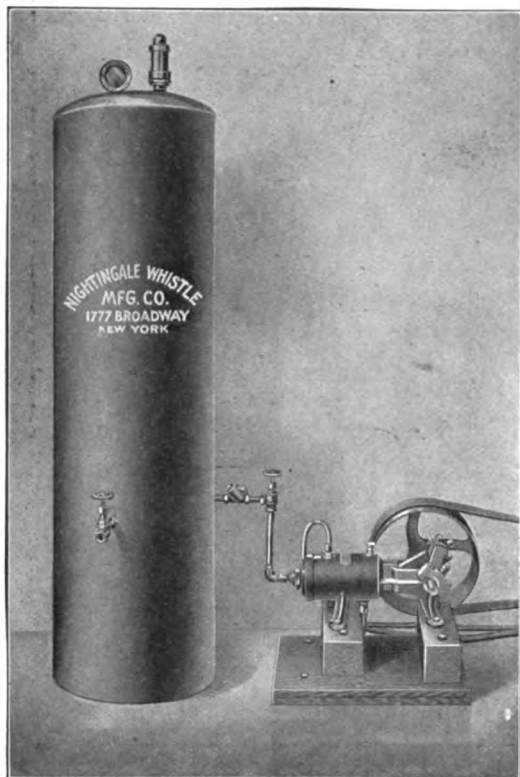
PRICES, 3 Inch, \$1.00 3 1-2 Inch, \$1.25
4 " 1.50 4 1-2 " 1.75
5 " 2.00

Mfd. by LYNN AUTO CO., 29 Sea St., Lynn, Mass.

With this Sleeve you can get from 500 to 1000 more miles out of your old tires.

Please mention the Automobile Dealer and Repairer when writing to advertisers.

GARAGE COMPRESSOR



**No Garage Complete Without
THE "IMPROVED DELPEUCH COMPRESSOR"**

Of metal throughout—No leather packing or washers

Of highest grade material and workmanship

Compact—Works in any position

Is water jacketed and can be run continuously

Driven from 2 H.P. motor direct or from line shaft

Gives 200 lbs. or more pressure in the shortest possible time

COMPLETE OUTFIT

Exactly as shown in cut

\$66.50

with tank (for 200 lbs. pressure, guaranteed air tight, size 60"x12") safety valve, globe valves, etc.

Will furnish any size Tank desired.

Nightingale Whistle Mfg. Co.

1773 BROADWAY, NEW YORK.

**Each year the selection of Tires becomes
more intelligent and less haphazard . . .**

**Each year manufacturers, dealers, and consumers
turn to Goodrich Tires in the biggest number ***

At the Madison Square Garden Show, Philadelphia Show, Kansas City Show,
and Detroit Show, more cars were equipped with Goodrich Tires than any other make.

Not "now and then" or "here and there" but everywhere and every year

Goodrich Tires Lead

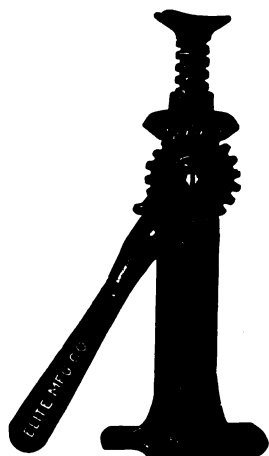
Branches in all large cities

**THE B. F. GOODRICH COMPANY
AKRON, OHIO**

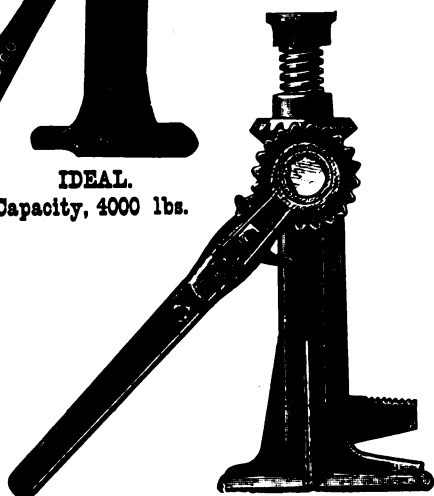
Please mention the Automobile Dealer and Repairer when writing to advertisers.

THE RELIABLE AUTO JACK

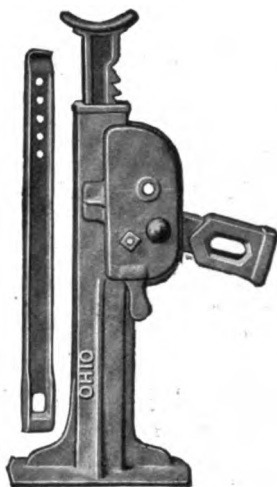
SAFE, STRONG, COMPACT, DURABLE



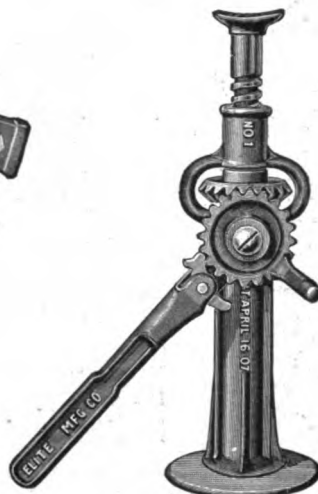
IDEAL.
Capacity, 4000 lbs.



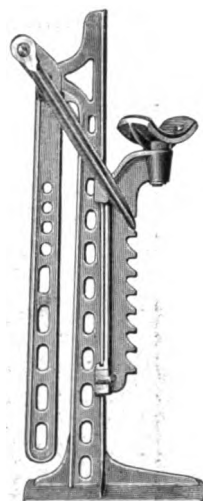
IDEAL TRUCK JACK.
Capacity, 5 tons.



OHIO RATCHET.
Capacity, 2000 lbs.



RELIABLE.
Capacity, 4000 lbs.



TIRE SAVER.
Prolonga the life of the tire one-third.
Has Swivel Top, Leather-faced Saddle, can be set under the hub or axle.

SEND FOR 1910 CATALOGUE AND DISCOUNT.

ELITE MANUFACTURING CO.,
ASHLAND, O.



BOSTON, MASS., Feb. 1, 1910.

About the first of EACH YEAR, during the Auto Show season, the Weed Chain Tire Grip Company customarily issue a general letter to the trade of merely a "scarehead" nature for advertising purposes.

This year has been no exception to the usual rule. Such a letter was issued by them, their attorney's letter, bearing no date whatever, but sent out about the first of January, in which several statements were made by their counsel, more or less of which statements are decidedly incorrect. This is the fact in one instance.

EXTRACT FROM LETTER OF VICTOR CO.

In a suit in Massachusetts brought by the Weed Company against Dr. Barrell and the Barrell Company, the Weed Company succeeded in obtaining a purely formal decree for injunction and accounting. As soon as we were apprised of this fact, we moved to vacate the decree; and as soon as the circumstances were presented to Judge Colt of the United States Circuit Court, he dissolved and set aside the decree, leaving the Weed Company in exactly the same position that it has occupied for several months past.

Very truly yours,

(Signed) EMERY & BOOTH.

Under date of January 10, 1910, this Company wrote to the Weed Company to the effect that if it seemed necessary to them to run down a competitor, all of the existing facts were to be taken into consideration. No reply has yet been received.

The Whittaker Company is still doing business and expects to extend the compliments of the season to its patrons for many years to come.

Yours truly,

WHITTAKER CHAIN TREAD CO., C. E. HOBBS, Treas.

Please mention the Automobile Dealer and Repairer when writing to advertisers.

WHY RUB UNTIL YOUR ARM ACHES?
WHEN LORD'S LUMINO BRASS POLISH WILL SAVE
YOU SO MUCH LABOR AND TIME.



Our FREE OFFER
 of a beautiful
COMBINATION CELLULOID
PEN AND PENCIL

with sample of

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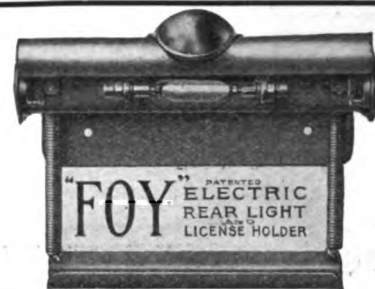
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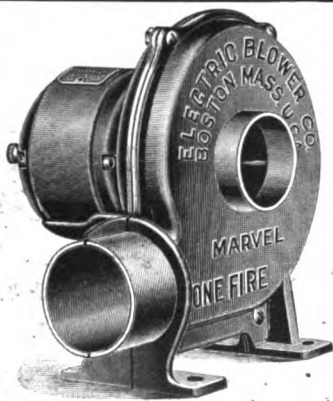
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THE BOSTON SHOW.

The Motor Vehicle Publishing Company, publishers of the **AUTOMOBILE DEALER AND REPAIRER**, will exhibit at the Boston Automobile Show. They will occupy space No. 329-AA, basement of the Mechanics' Building. F. R. Whitten, secretary and advertising manager, will have charge of the space and all friends of the publication will be welcome during the show.

Move of a Big Firm.

Another big motor car concern has been acquired by the United States Motor Company, the recently organized \$16,000,000 corporation. The latest acquisition is that of the Columbia Motor Car Company of Hartford, Conn., established in 1895, which is one of the oldest builders of automobiles in this country, having a mammoth plant equipped with the best modern machinery and suitable for turning out high-grade motor cars in large quantities. The announcement was made a few days ago of the acquirement by the United States Motor Company of the four plants of the Maxwell-Briscoe Motor Company, situated at Tarrytown, N. Y., Newcastle, Ind., and Pawtucket, R. I.

An important feature of the deal is that the royalties accruing from the Selden patent, which is controlled by the Columbia Motor Car Company, will be paid to the old stockholders of the Columbia concern.

The Columbia Motor Car Company, which up to about a year ago was known at the Electric Vehicle Company, enjoys a unique position in the motor car industry, as it

not only controls the basic Selden patent, but 128 other patents fundamental to the structural features of automobiles.

When asked regarding the addition of the Columbia concern to the ranks of the United States Company, President Briscoe of the Maxwell-Briscoe Motor Company said:

"The patent situation in this industry is a most important and interesting one. I had never thought much about this phase of the business until the decision of Judge Hough was rendered declaring the Selden patent valid. This decision opened the eyes of the Maxwell-Briscoe Motor Company, as well as other independent motor car makers. It cost the Maxwell-Briscoe Motor Car Company \$150,000 to protect Maxwell dealers and owners to say nothing of the jeopardy to its future business."

The Delmar Auto Body & Wheel Company has recently been established in Indianapolis, Ind. It is backed by some of the most prominent manufacturers of Indianapolis, representing more than \$1,000,000 of capital stock. Already substantial orders are on hand from local manufacturers.

Shrewd owners of cars in big cities have discovered that the proprietors of country painting shops do not place any very high value on their storage space, and consequently a car may be left all winter without storage charge provided there is a painting job to be done on it.

CAR DRIVING.

The Passing of Bill Jenks, and His Recklessness of Speed and in Making Turns.

BY JAMES F. HOBART, M. E.

Of course you've seen Bill Jenks? Everybody has seen him, and nobody ever said they were glad to see him, either. Bill is one of those fellows who always skins along and escapes unharmed, when most men would be killed, or maimed for life. Bill is one of those fellows who isn't worth killing. If he had been, the Fool-Killer would have gathered him in long ago. Only to-night, just at dusk, Bill came along in that forty of his, and drew up with a mighty rush in front of a livery stable, where a small crowd had collected to watch the departure of a sleighing party. Bill never slackened speed until he was within sixty feet of where he wanted to stop, then he jammed down the brake and brought his car up "all standing" beside the curb and head-on, within twenty inches of a monster of a telegraph pole. As the car swerved toward the curb, headed directly toward the pole, a gentleman on the seat with the driver, shouted: "Oh! Look out for the pole;" and half rose to his feet. So great was the retarding force of the brakes that the gentleman was shot from the car and nearly collided with the telegraph pole, so great was his impetus as he was tossed out of the car.

That Bill Jenks, his machine, passengers and himself were not killed or seriously injured can only be laid to the account of most excellent material and workmanship supplied by the makers of that "forty" which Jenks handled so recklessly. Had there been "shoddy" work or material in that car, there would have been a serious accident, and "Bill" might be in a place where they don't use automobiles.

While this man is aiding the manufacturers of brakes, tires, engines and other automobile parts—while he is aiding them in one way, he is a positive injury to them in several ways. Although he has to purchase new brake apparatus twice as often as a decent driver does, and thus makes the brake manufacturing business good, he lowers the average life of the appliances made by the several concerns, he adds to the number of failures of brake or crank-shafts, to the replacement of parts by natural wear, and to the possibility of accident to life and property through failure of material or workmanship under undue stress. Thus, the freak driving of each and every "Bill Jenks" is a menace to the good name of each manufacturer of automobiles or automobile parts. And the worst of the matter is, there seems to be no way of abating such nuisances, or of holding them in check.

The present laws do not reach this class of drivers. There is nothing to do but to "grin and bear it," unless new laws are created to reach the fool drivers. And fool drivers they are, nothing more or less, and so is any man who takes unnecessary chances of accident, be he driver of automobile or of horse and wagon. When a driver is following a mountain road, cut from the solid rock, with hundreds of feet of sheer descent on one side of the trail, and hundreds of feet of piled-up rock on the other side, the driver can only be regarded as criminal, who will deliberately try to see how near to the edge of the abyss he can drive the wheels of his vehicle and escape falling over the edge! Such a driver is foolhardy, therefore he is a fool. He should keep as far as possible from the edge of the precipice; otherwise, he is a "Bill Jenks" who tries to see how close to a telegraph pole he can approach at

full speed on the high gear and still be able to stop the machine before hitting the pole!

Let us have laws enacted—and enforced which will deal severely with drivers who evince symptoms of the "cussedness" displayed by the Bill Jenks type. Let it be made a misdemeanor for any man to drive an automobile in that manner, said misdemeanor to be punished by heavy fine for the first offence, heavier fine and imprisonment for subsequent offence, one-half the fines to go to the person who enters complaint against the driver for reckless handling of his automobile. Let this be made the law, and there will be less "dare-devil driving" and fewer accidents from this cause—accidents which are now far too numerous, and which outnumber football accidents, ten to one.

And now, aside from the moral side of the question, let us see what effect this kind of driving has upon the mechanism of the automobile. To begin with, it will raise the very mischief with the tires. All the strain of stopping the vehicle must come upon the tires, and upon the driving tires at that. Let's see what power has to be exerted in order to stop a car weighing 3000 pounds in 60 feet, when the car is running at the rate of 20 miles an hour. This speed means about 29 feet a second, and when the car is stopped in that number of feet in one second, it must have an average velocity of $14\frac{1}{2}$ feet for the one second in which it is brought to rest.

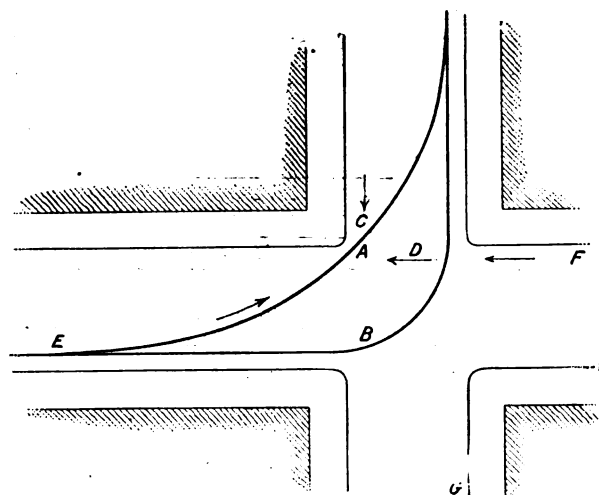
We will cut out all the "hammer blow" force which may be in the projectile, for that is just what the moving automobile amounts to, and take only the weight of the vehicle and the distance passed over in a certain time, which is 29 feet. To determine the force of retardation, which, neglecting friction, is the same as would be required for starting the auto from rest up to a speed of 20 miles an hour in the same time, we must multiply the weight of the machine by the distance passed over and divide by 16.08, and by the square of the time in which the starting or stopping was done. The 16.08 is the distance a weight will fall in one second. We cannot get away from gravity in these starting and stopping problems; for it is necessary, in order to determine the points of these problems, to imagine the actual velocity as produced by the weight of the vehicle falling through a certain space, and the space, 16.08 feet, through which a body will fall in one second, is the proper figure to use in this problem.

The time occupied in stopping the automobile being one second, the square of that quantity is also one, therefore this factor drops out altogether. This would not be the case were the time of stopping more or less than one second. But as it is, the force necessary to stop the machine, is $3000 \times 29 \div 16.08 = 5410$, which is the amount of drag in pounds, which it is necessary to put upon the tires during the one second in which the car is being stopped! But here we strike a snag: The car weighs 3000 pounds, and probably not more than one-half that weight comes upon the pair of wheels affected by the brake. Therefore, there is only 1500 pounds of automobile to cause a 2705 pound drag upon each of the tires which are affected by the brake!

But, even with the best of chain shoes upon the tires, it is quite a task to obtain a drag power of 600 pounds on each wheel when the total weight on it is only 750 pounds! I tell you what, Mr. Editor, and fellow readers, these big stories about running 40 miles an hour and stopping dead in 50 to 100 feet, look rather "fishy" when they are figured with a little bit!

It looks as if Bill Jenks would be hugging that pole, even if that stopped him, for all that brake traction could have done under the conditions. But be that as it may, the point I want to illustrate is the drag on the tires necessary when such sudden stops are to be made. Here, it is necessary to drag against each power tire with a force of 600 pounds for three seconds. Here is where an auxiliary brake upon the other pair of wheels would come in handy.

Aside from the strain upon the tires by applying the brake, consider a little what the effect is upon the engine. All moving parts store up work and give it out again when they are being brought to rest. It is the same with the moving parts of the automobile engine. Just at the point of an explosion, the power developed and transmitted to the crank is tremendous. Many times I have seen it break an engine indicator and scatter the lever and its connections over the floor. When these impulse explosions are met by a sudden drag of 2700 pounds in the opposite direction, the stress developed in the metal may be imagined. Consider also the effect upon the chain which has to stand all this stress between engine and the tires! Is it to be wondered at that not only do tires wear out quickly, but that chains break too frequently, that



Cutting the corner.

crank shafts are crumpled up, and that power axles frequently "let go," sometimes with disastrous results?

The passing of the Bill Jenks type of automobile driver is demanded for the good of the automobile and for the safety of the public. It is to this type of driver that the numerous accidents are traceable to the extent of 99 per cent. It is a true statement that not more than one accident in 1000 to yachtsmen ever happens which is not traceable directly to the effects of "booze" on board at the time of the accident, and that the odd accident is chargeable directly to the "fool-killer" for missing an aquatic "Bill Jenks" on his last trip around "the briny." But it is different in automobilizing. Only the odd accident can be charged to drink, but "Bill Jenks" must shoulder the other 99!

In addition to the "Bill Jenks" who are hazarding their lives and making the country unsafe for its citizens, there is another type of the same class, which is always abusing the clutch mechanism. Luckily, this type seldom injures anyone but himself and perhaps his passengers. Usually, the harm is all done to the automobile mechanism, and as the man who does it must pay therefor, this form of Jenksism is not as dangerous as the brake fiends, who are liable to

jeopardize the life of each and every person they pass, when the freak takes them to stop suddenly.

And I have got an axe for another type of Bill Jenks, who makes turns so suddenly that two wheels of the auto are in the air while he is doing it. This form of "sailing" is all right in ice-yachting, for as the sail lays over, the wind is spilled out of it, and the boat is prevented from overturning. It is the same with a water vehicle, but it don't go with the automobile. Luckily, however, this form of driving seldom imperils anybody but the occupants of the vehicle, and if they are not minded to throw Jonah Bill Jenks overboard and put a "safe and sane" man at the wheel, then their sins are visited upon no heads except their own.

But it is the corner-cutting Bill Jenks whose scalp should be tucked into the belt of the policeman or the fool-killer. This piece of idiocy imperils many pedestrians and drivers and passengers of other vehicles. Who has not seen it done as shown by Fig. 1? The driver who takes the route shown at A, is the one I am after! This chap is more than foolish and careless. He is fiendish, and should be promptly placed where the dogs cannot bite him; i. e., safely in jail! Not only does he come suddenly upon the person or vehicle coming down at C, but he also interferes greatly with traffic which may chance to be at D, coming along the other street. The vehicle caught at C, can only stop dead, if it can do that quickly enough. There is no chance to escape by swerving to the left a little, as would be possible and easy were the meeting at B; and the vehicle coming along at D, is also in a bad way. True, this vehicle can turn to the left, but its driver is apt to be caught before he can do so for the reason that he is not looking for this kind of fool auto-driving. He sees the car at E, but naturally supposes that its driver will proceed by the B route as he should, and pass behind the D driver. Taking this view of the case, D must also stop dead, if he can, to the general discomfort of the travel on both streets from F, and G.

Were the automobile driver to take the course shown at B, all this trouble would be avoided. Vehicles from either direction, on each street would have ample opportunity to regulate their pace so as to avoid him and everybody would be satisfied. The traffic from F, could slow up or swerve to the left to avoid B. Vehicle from G, would have no trouble whatever in falling into the procession. While traffic from C, would have a plain and unobstructed view of the movement of the automobile from C, to B, and therefore, would have plenty of time to go either ahead or behind the car, according to the relative speeds of the two vehicles. In some cities, the cutting of a corner in this manner, is the only proceeding necessary to land the man who does the act, safely in quod. It should be so in any city or town in the world, and the tin-plate constable should be instructed to enforce the same rule, "By Heck!"

Another thing, which should be given more attention, in certain sections of the country, is what may be called the courtesy of the crossing. When two cars or an automobile and a trolley car arrive at a crossing at nearly the same instant, there is usually a well-determined manner of precedence—a sort of unwritten law, so to speak, which is usually understood and obeyed by both the automobile driver and the motor-man. In some cities, in Philadelphia, for instance, there is to be noticed a very practical, useful and courteous exchange of signals between the two automobiles, or between the auto and the trolley car. Should the latter claim precedence to the right of way,

the motorman will strike his foot gong two strokes to signify that he is intending to proceed. If, on the other hand, he is handling passengers and desires the auto to proceed, he will strike one stroke, signifying that he is not intending to start immediately.

The beauty of this method of signalling lies in the fact that the other vehicle responds to the signals. For instance, when the auto driver hears the two bells from the trolley, and decides to wait for the passage of the electric, he replies with the same signal—two bells, or toots on the horn, and the street car motorman knows that the way is clear for him to proceed with no farther thought as to the intentions of that automobile driver. But should the auto driver find it necessary for him to move in opposition to the signal of the car driver, then he replies with a single stroke of bell or toot of horn, and the motorman knows that he must look out for the automobile which is intending to cut in ahead of him, and he must then watch out and govern his movements according to the conditions at hand. The system is a most excellent one and is worthy of being adopted by all the automobile clubs and electric car lines, by whom the somewhat crude system could be elaborated and worked into a perfect code of signals for every condition likely to be met with.

Thus may the driving of automobiles and cars be made safer and easier in cities and towns, and the crazy antics of all disciples of "Bill Jenks" gradually discouraged and eliminated. I cannot close without adding one more protest to an already rather long list, and that is, for the "squelching" of the automobile driver who stops his car suddenly in a crowded street. This is another misuse of the powerful brakes with which automobiles are necessarily fitted. This should be made a misdemeanor and rigidly punished by law. It is bad enough for a horse-drawn vehicle, or even a foot passenger to stop dead short in a crowded thoroughfare, but for the auto to do it, is something more than careless, and it should be provided with a severe penalty.

DRIVE THEIR OWN CARS.

The Number of Car Owners Who Do This Is Constantly Increasing.

The proportion of owners who drive their own cars is constantly increasing. In some cases this change has been wrought through expensive experience, for not only have owners been obliged to pay large salaries to chauffeurs, but they have likewise been compelled to pay double what they should for upkeep simply because of the aforesaid chauffeur. But it is a fact which will not be discussed, that dealers are as a rule anxious to include in their "deal" with the purchaser a chauffeur who knows the car in question and will be able to keep it always running.

But despite this, the elderly man as well as his son will learn more of the enjoyment of life, if he drives the car himself. The man who cannot find pleasure in tinkering with the car himself, and would rather hand it over to a mechanic when it misses fire, or a tire goes flat, should have that employee on a rumble seat, ready for use. The younger man will find that a little common sense applied to the car through the medium of his own hands will do him no harm, and rather heighten the joy of possession and mastery.

Driving an automobile teaches decision, the faculty to meet, consider, and cope with obstacles without hesitation. It teaches patience, for the driver learns that he must always be occupied and composed in order successfully to overcome the difficulties of driving in traffic. Driving and caring for the car develops observation,

creates a necessity for ingenuity, and broadens the mind by teaching reasoning and calculation in a new school.

In no way can one get the fresh air as effectively into the lungs as by the use of the motor car with the wind shield down. The very motion of the vehicle acts as a force pump to send air into the long-deprived body, to quicken the circulation, to put color into pale cheeks. And when the patient has the wheel in his own hands he must needs forget himself and consider the road and all that is on the road. With a modern car the control is simple and easy, so that there is little to tire one, and what boredom might come from sitting quietly without exercise, in another seat, is avoided.

While for city use the liveried chauffeur and helper will continue to be the luxury of the wealthy, there are a great many more people who can and will motor, driving their own cars, in this year of 1910 and succeeding years, than now.

Some of the cheap cars to-day are better than the good cars of yesterday, for it was only a few years ago that motor cars were in the experimental stage. Barring collisions and accidents the car to-day is not expensive even for one of moderate means. It may fairly be said to be an investment paying constant dividends in health and happiness.

Besides mental and physical benefits the driver of his own car without or with the mechanic will find he has at his hand a convenient way of travelling either short or long distances—a means to shorten the distance between town and country without the necessity of spending an hour or two in a stuffy or draughty Pullman or coach, and with no need to think of train schedules.

OLD TIRES.

The Question of the Repair or Continued Use of Old Covers.

Many tire covers, while they are not, strictly speaking, absolutely beyond repair, are, nevertheless, damaged to such an extent that their renovation would entail an expenditure that would be out of all proportion with the amount of service they would render. For instance, it would not be worth while having a cover retreaded, unless its canvas is in thoroughly good condition. But you must not run away with the idea that, because a cover may not appear to be worth repairing, it is only fit to be condemned as absolutely useless, and thrown away. On the contrary, it is still good for quite a lot of work. You can fit it to one of the front wheels of your car, where the work is lighter, and it will serve you well for quite a considerable time; or you can carry it as a spare, to use in a case of extreme necessity.

In this way you can effect an appreciable economy, because by far the greater number of such covers, used as indicated, are still good for some hundreds of miles.

"That's all very well," the driver remarks. "You advise me to continue using my cover, which, as you say, is not worth repairing, but which, all the same, is still good for a few hundred miles. But you don't think that I'm going to risk a burst and so stand a chance of losing a tube as well? Oh no! I'm not *looking* for trouble."

This reasoning looks sound; but it isn't. It is quite evident that if you go on using a cover which is nearing the end of its life, it is very possible that it *will* burst, at some time or other, and that the result will be serious damage to the tube, if not its complete destruction. But, accidents excepted, of course, it is surely not a very difficult matter to prevent, or at least avoid, such serious damage.

For one thing it is not absolutely necessary to use a brand new tube with the old cover. Drivers should never fit any but their oldest and least valuable tubes with covers

whose condition is doubtful. Then, if trouble arrives unexpectedly, the driver will at least have the satisfaction of knowing that he is not much out of pocket. Another point; a cover will not, as a general rule, burst without giving beforehand some outward sign that trouble is brewing; and if the driver knows that the cover is in a precarious state, he would—or should—watch it more closely than he would a new cover. Of course, if any such indication should appear—a swelling, for instance, which is an infallible sign of an approaching burst—detach the cover at once and don't use it again.

But when a tire bursts as the result of an *accident*—and many a perfectly sound, new and absolutely faultless cover has been victimized in this way—no warning is given, nothing can be foreseen, no preventive measures can be taken.

If you want to get every ounce of wear out of your tires, be sure to keep the inner surface of the cover uniformly even. Suppose, for instance, that the tire is subjected to such a very severe strain that the canvas lining tears. The outside of the cover may show nothing unusual, but the inner surface will be roughened where the trouble has occurred. It should not be left in this condition. Apply a patch, or, if the case is not serious, a strip of gummed canvas, to the uneven place. The object in doing this is to protect the inner tube, to prevent it from being chafed and worn against the roughened lining. Some people may think that this isn't important enough to make a note of; but it is.

A Money and Time Saver.

One of the superintendents of several oil plants in Ohio got an automobile the past year and he says it serves him better than five or six horses and with much less care and a smaller investment. He adds:

"Not only was there a saving in the support of the horses and in the maintenance of vehicles, harness, horse-shoeing, etc., but there was such a saving that I could cover the territory traveled in less than one-half the time required by a horse. For quite a while the companies supported the investment in a number of horses and equipment, and I soon discovered that there was more economy and less risk of loss in hiring from the livery, all of which has proven out since disposing of the live stock and accessories, and the acquisition of the automobile.

"The skilled mechanic must live, and it requires mechanics, who command good wages, to produce automobiles, but it requires no labor to produce horses. Thus we see new factories springing up on all sides of us, employing skilled and unskilled labor of all kinds, while should we depend upon the beast of burden entirely, these thousands of laborers would be without employment and without the breadstuffs that the horse consumes.

"The horse has been and will undoubtedly continue to be a noble servant of the people; but as the public learns the difference in the cost of the support of the horse and other motive power, they will gradually drift to the less expensive and more reliable gasoline motor power. The horse will, of course, continue to be used as an animal of burden and of pleasure for years to come, but the auto and other means of locomotion will gradually supplant him.

"The automobile or gasoline engine is always ready and you are at once in action, whereas the horse must be fed, watered, curried, harnessed, hitched, unhitched, re-fed, bedded, shod and numerous other attentions given, which in total far exceeds the expense of maintaining the ever-ready and swift-flying auto. From any point of view—investment, service, reliability, maintenance and get-there qualities, the auto has the horse bested forty ways."

How to Sell Cars.

The successful automobile seller must have the construction, running and care of automobiles at his fingers' ends and be able to communicate his knowledge in an interesting and instructive way to possible buyers. He must be sure of his ground and have absolute confidence in his own arguments, because he never knows when he is going to talk with a man who knows as much as himself—perhaps more. His mechanical education and technical understanding should, therefore, be perfect in every detail. His knowledge of parts and even of repairs should be practical and thorough, and he should be able not only to direct the arrangement, adjustment and repair of parts, but to do all these things without assistance. And, inasmuch as his selling efforts are usually exercised among educated and refined persons, his appearance, speech and bearing should match his clientele. He should be earnest, but not importune, and as good a listener as he is a talker. As his probable customers are liable to be of the leisure class, he should be ever ready to fill engagements and give tests and demonstrations at any time.

He must be good tempered, good natured and pleasant of speech. He should be able to translate the technical into the simple when describing his particular make of machine, and he ought to be familiar, not only with the chief points of excellence in his own car, but also with the main merits and demerits of other makes. He should be ready for every question a possible customer may ask, and anticipate every objection that can possibly be raised. He should let it be plainly seen that he is less anxious to sell than to satisfy. He may need other qualities, but sufficient have been enumerated to lift the high class automobile salesman out of the ranks of ordinary sellers of goods and put him in a class by himself.

More Points for Car Buyers.

Intending purchasers of a car should see that the car seats the number of passengers desired, and seats them comfortably. Comfort is the prime requisite in a car. Observe whether the car has sufficient power to carry its load at the required speed and that it picks up speed and is able to negotiate hills on high gear without pounding or labor. Quietness and lack of vibration denote economy of upkeep. Note the flexibility in the range of speeds on the throttle without changing gears—how slowly it will run on high gear without the clutch slipping. Flexibility is most important, as by virtue of it gear changing is avoided and the car is enabled to cover a greater distance in a given time.

A good motor should be able to accelerate and pick up speed on high gear almost at a touch. A sluggish motor is dangerous, as there are often times when quick and immediate action is necessary. The engine should start at a turn of the crank. Two ignition systems are an advantage.

General appearance, comfort and durability are points that can easily be judged by the reputation of the makers. Beauty of body lines and upholstering are external points which mark the high grade car and can never be faked. Last and not least is the care of the car after its purchase. Will the firm stand back of its product and give prompt and cheerful service when a repair part is needed?

Lost Motion in the Steering Gear.

Look out for lost motion in the steering gear. It has led to many accidents and makes it much harder to keep in a straight course. You can usually find out just how worn your steering gear may be by noticing the wobble of the front wheels while passing over a piece of rough road.

Automobile Dealer and Repairer

A Magazine of condensed and compact information for busy readers.

OFFICIAL ORGAN OF THE NATIONAL RETAIL AUTOMOBILE DEALERS' ASSOCIATION

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ADVERTISING RATES MADE KNOWN ON APPLICATION

NEW YORK, FEBRUARY, 1910.

Missing Numbers—Our readers are requested to remember that it always gives us pleasure to re-send numbers which have gone astray in the mails.

The Automobile Dealer and Repairer in Australia and New Zealand.

Mr. R. Hill, Matlock House, Devonport, Auckland, New Zealand, is our accredited representative in Australia and New Zealand for obtaining new subscriptions.

THE POSTAGE MENACE.

Are the people to be deprived of cheap postage on periodicals?

This is a question of the greatest importance, and one which should enlist the attention of every reader of a periodical of whatever kind.

President Taft, in his annual message, called attention to the deficit of \$17,000,000 in the Post Office Department and laid all the blame on the second class publications, which he says the Government is carrying at a heavy loss. He calls the rate of one cent a pound which publishers pay on magazines and other publications a subsidy, but if it is a subsidy, as the "Iron Age" points out, it is a subsidy for the subscribers and not for the publishers.

The low postage rate of one cent a pound on second class publications has made cheap literature for the people possible. In practically all cases, it may be said the publisher is giving the benefit of this low rate to the subscriber. An attack, therefore, on the publishers, is an attack upon the subscribers to all second class publications.

Why should the Post Office Department, of all other departments of the Government, be expected to pay a profit?

The Agricultural Department is maintained at a heavy expense, and without any prospect of profit, for the benefit of the farmers of the country.

The Navy Department is not expected to pay a profit, neither is the War Department nor the Interior Department, nor any other.

For 25 years or more, the publishing business has been fostered by a low rate of postage. The people have become accustomed to the low subscription prices, which this low rate of postage makes possible.

Do you, as a subscriber for this magazine, and for perhaps many other publications wish to pay from 25

to 50 per cent. more for your reading matter, than you are paying now?

We do not believe you do.

There is one way to prevent a raise in postage and that is for each subscriber to every second class publication in this country to write to his Congressman and protest against any raise of this sort.

It is not really true that there is a deficiency in the legitimate business of the Post Office Department. The deficiency has been brought about simply by the Rural Free Delivery Service. Eliminate Rural Free Delivery, which cost the Government \$28,000,000 in 1909, and the department would have shown a profit that year of over \$11,000,000.

We are not making any attack on Rural Free Delivery. It has been found a great convenience to large numbers of people, and is likely in the future to be very greatly extended. This service has grown enormously since 1902, when Third Assistant Postmaster General Madden said that there would have been a profit in the Post Office Department that year, if it had not been for the extraordinary expenditure of \$4,000,000 on Rural Free Delivery. In six years, therefore, the cost of Rural Free Delivery has increased from \$4,000,000 to \$28,000,000, and no man knows where it will end.

Such a service as this should be maintained and extended, but only by a special appropriation for that purpose.

The great bulk of the readers of the country derive no benefit from Rural Free Delivery, and why they should be taxed (and they will be taxed by increased subscription rates) for the increase of this service is a question which nobody of the Post Office Department is able to understand?

It will be noted that President Taft in his remarks on the second class postage question was disposed to lay the whole blame on the magazines and other weekly and monthly publications, and to exempt the daily papers from a raise of rates because he claimed that the hauls on the daily papers were much shorter than those on the magazines.

The true reason probably for recommending that the daily papers should not be included in a raise of rates is a political reason.

Then there are the country weeklies, which go through the counties in which they are published free of charge, and that is well enough of course, but why should a reader located in a town where there is a local paper published, be expected to pay a large increase in the subscription rate of the other periodicals he wants, just for the sake of getting his local paper free of postage?

We are perfectly satisfied to have the local papers go free in the counties in which they are published. We are satisfied to have the dailies go at one cent a pound, but the other second second class publications should go at one cent a pound also. It is not at all fair to make fish of one and fowl of the other.

We want to ask every reader of this paper, who agrees with us that there should be no increase in subscription rates, (caused by an increase in postage) to write to his Congressman and protest against any such raise.

It will only take a few minutes time and a postage stamp to address a letter to your Congressman at Washington, and it may save you considerable money in the future on the various publications to which you subscribe.

If perchance, as it often happens, that any reader does not remember the full name of his Congressman, he can easily get it from his postmaster and then a

letter addressed to him "House of Representatives, Washington, D. C." will be sure to reach its destination.

AUTOMOBILE FIRE APPARATUS.

Cities and towns of enterprise and wisdom are everywhere substituting motor driven for horse driven fire apparatus.

Just how there can be any question as to the economy of a step of this kind is beyond comprehension. If there is any case under the sun where automobiles are infinitely better than horses, it is where they may be called upon for use infrequently, but when they are needed they are needed mighty bad, and where the question of speed is of the utmost importance.

Horses "eat their heads off," so to speak, about once in two years, and it costs as much to keep them when they are used but once a week or once a month as if they are used every day. When an automobile is not used it costs absolutely nothing for its up-keep.

In addition to this, an automobile will get to a fire in less than one-half the time of the speediest horses that ever lived. And, by the way, getting to a fire quickly is of the utmost importance; we were about to say, it is about all there is to it. There is no fire in the world that cannot be quenched without loss—provided the quenching is done in season, and there is none that can be quenched without loss provided it is not done in season.

Of course, much depends upon how a fire is handled after it gets well to going, but any one can handle it when it first starts.

A well-known automobile manufacturer is now building a combination chemical engine and hose wagon which is equipped with a large chemical tank and carries 1,000 feet of hose. In general appearance it follows automobile lines and is fitted with pneumatic tires. Machines of this type are designed to be used by ten picked firemen who can thereby reach the scene of a fire in the shortest possible time and put it out before it has had time to get such headway as to resist the fire-fighting ability of the more powerful and slower-moving fire pumping engines. In towns equipped with water mains and pressure systems the ability of the chemical wagons is supplemented by the streams of water which can be thrown by using the ordinary fire hose carried on the motor wagon.

In addition to the main chemical tank, wagons of this type are equipped with hand extinguishers and firemen's tools. Acetylene headlights are fitted and oil running lanterns, that can be quickly detached.

Any city or town that uses horse-drawn fire service vehicles to-day is both flagrantly extravagant and negligent.

A MIGHTY INDUSTRY.

The automobile is epoch making.

Considering the time it has been in existence, it employs more capital and labor and affects more people than anything ever before introduced into the business world.

Neither the invention of the steamboat, the locomotive, the telegraph nor the telephone has employed a tithe of the capital in ten times the duration of time.

In the single branch of tire making—one simple auxiliary of the business—the enormous sum of \$25,000,000 is invested in one city and more than 12,000 men are employed there on the work. In the manufacture of cars and accessories, in this and other countries, not including tires, the invested capital runs well up among the hundreds of millions of dollars, and the

men employed are as far along among the hundreds of thousands. And the ground has scarcely been scratched.

The automobile has brought the country right to the door of the city. It has made neighbors of people living 100 miles apart. It has made it possible for the doctor to reach his patient in one-fourth of the time, and to double his visits. It has become the first real competitor of the railway, and as the use of the automobile increases, the railway business will decline. Those who own cars are independent of railway time tables, and they can start and stop whenever or wherever they please.

The claim has been made that it has displaced few horses, but the fact is, it will soon put the horse out of business altogether except in rare cases, such as for park driving, for horseback riding, and for localities where there are absolutely no public highways.

Recently it has demonstrated beyond question its superiority over the horse for trucking and delivery service, although for a long time this was disputed. Its economy and efficiency are now recognized, and merchants are taking notice of its success to a degree it was long impossible to enlist. During the present year more power-delivery wagons will be installed than in all the time the automobile has been in use.

It will soon be almost universally used by doctors, and drummers are finding that it has some very important points of superiority over the railway service.

Moreover, it is doing a most important thing in making moderate welfare more widely diffused. The automobile tourist leaves a trail of gold in his wake that is as refreshing and useful in these days as dew and sunshine to the face of nature.

Of course, it is impossible to judge what might have been if this or that had not happened. But when one considers that amount of capital and of labor that has been and is employed in the manufacture of the automobile, the question naturally arises, What would have been the condition of the business world without this gigantic industry? How otherwise would or could this capital and labor have been profitably employed? And failing thus to be employed, what would have been the consequence?

FOUR ALL-IMPORTANT WORDS.

In just four words we will tell car owners, users and manufacturers how to get rid of pneumatic tires, of shock absorbers, of the straining and wrenching of car machinery that shortens the life and usefulness of the car one-half, of springs that must be so easy that they are constantly liable to break, of the consumption of so much fuel, and of the necessity for such tremendous weight and strength of the car.

Now it will be generally admitted that an improvement of this kind would reduce the cost and maintenance of the car at least one-half, and increase the number of car users at once by one-half. And the remedy is as simple as it is effective. Here are the four words:

Give us smooth highways.

Of course, there is nothing new in this. But in the struggle for improvements of the car, and for a panacea for an effect, why not give just a little more attention to the cause? Why not all pull together with a combined and mighty and continuous pull for good highways?

No practical man will maintain for an instant that the world's supply of rubber will long hold out for pneumatic tires and for the other purposes for which rubber is essential with the drain that is now being

made upon it, and no practical man will for an instant claim that anything is likely to be found to take its place. In a very few years the cost of raw rubber will be so high that it will simply be prohibitive for ordinary use. The reply to this might be the hackneyed one, "let us cross that bridge when we come to it." But we are crossing the bridge now. With substantial and well made cars the cost of tires is already the heaviest expense of car upkeep. So why not begin to make the mighty pull for good highways now?

Why, the running of automobiles on the average highway in this country is about as short-sighted and flagrantly extravagant as it would be if railway cars and locomotives were run on the ties rather than on steel rails.

There might possibly be some reason for apathy or indifference if smooth, substantial and permanent highway construction would affect automobile users only. But it affects every man, woman and child in the country. For not only is it of the utmost importance to users of horse-drawn vehicles, but it makes for lower prices for the things we all eat and wear. It will do more; it will prevent the tendency to a monopoly in general transportation.

Just now there is a great upheaval of public sentiment concerning the cost of the necessities of life and especially of food products. Give us good highways and it will not only reduce by one-half the principal expense that adds to the high cost of these products of the farm, but it will do something toward the monopolistic tendency of general transportation.

No public utility is so important, none concerns such a large number of the people, and none will give so large a return for the outlay as good highways.

CATALOGUES.

It is a good idea for car manufacturers to have well printed catalogues. They should have illustrations that show clearly the parts and the construction of the car; the specifications should be fully and even minutely given, and the text should be plain and simple, so that any one can understand it.

But some manufacturers put out catalogues that cost a dollar each, and as long as the expense must be borne by the purchaser, it may be questioned whether something less expensive would not meet all requirements and give the intending buyer a better impression of the profits of the business.

High priced paper, fine printing and expensive illustrations, make a good catalogue, but they do not make a good car. Moreover, good catalogue makers are not always good car makers, and vice versa.

"TRICKS."

There is a woman automobile agent in New York City—the only one in the country, it is said—and here follows the way she unbosomed herself to a newspaper reporter, the other day, assuming of course, that the aforesaid reporter was telling the truth:

"There are all sorts of tricks in this trade, as in all others. Sometimes I have to pose as the owner of a car in order to sell it, though as a rule I appear as what I am, the agent. I have to be, and am, able to run any machine on the market. I have to know also a great deal of the mechanical part of it, for we are apt to have little accidents while I am taking prospective purchasers about, and I get out and investigate, to start things going again."

The foregoing is decidedly unique. It reveals an unusually peculiar moral and business attitude—this pretending you are an owner of a car instead of sim-

ply an agent, and having "little accidents" when you are out demonstrating. *O tempora, O mores.* Yes, indeed, there are a whole lot of "tricks"—but let that pass.

TASTES OF PURCHASERS.

The manufacturers of a well-known car—and one of the best at that—have been investigating as to where their output for the current year is going, since it has already been spoken for. They find that exactly 47.5 per cent., or practically half, of the output goes into the hands of former owners of the same name of car. Of the remainder, 35.6 per cent. are bought by those who had owned cars of other makes, and 16.9 per cent. to those who had never owned a motor car before. This is both gratifying and creditable to the firm, but as a rule most car owners like to continue using one and the same kind of car, especially if it be one of the higher class. But why should those who have purchased one of the high priced cars feel inclined to get another after two or three years of use? Outside of tire and ignition replacements, a car should last a dozen years, and it will, if properly constructed and used.

LESSONS FOR DRIVERS.

Carelessness and Ignorance Responsible for Most Accidents.

There is a gratifying diminution of accidents this month. Quite likely it is in part due to the decreased use of the automobile in winter weather, but it is hoped that it is likewise due to more care and greater knowledge on the part of the drivers. And in referring to the word "knowledge" we do not refer to a knowledge of the mechanism of the automobile, but rather to knowledge of the dangers of high speed—of the difficulty of control of a body weighing, say, a ton, when moving rapidly. Of course, a dozen pages could be filled with accounts of accidents, but they would be mostly of a minor character, with a large sprinkling of instances where the victims themselves were distinctly at fault. The following are a few which are more or less instructive:

Results of Employing Boy Chauffeurs.—In St. Louis, Mo., the newspapers report six deaths recently, and all due to the employment of boys as chauffeurs under 21 years of age. Naturally the matter has caused a good deal of discussion and the Legislature of that State has proposed fixing the age limit at 21 years instead of 16. Possibly this may be well enough, but it should not be forgotten that accidents are not due so much to youth as to lack of care and character. Some boys of 18 years may have far more sense and judgment than many mature men, and when automobiles come into universal use it will be simply impossible to fix a driving limit according to age or anything else.

The Car Turned Turtle.—Five men were hurt when an automobile turned turtle when attempting to climb an embankment in the early morning hours at Fairmount Park, Philadelphia. Two of the occupants were pinned to the wreckage and were rescued with difficulty, and taken to the hospital. According to one who saw the accident, it was quite spectacular. The car left the street, mounted an embankment, and seemed to pause for a moment on the edge of a decline leading to the river, then it turned completely over, and came to a sudden stop.

Ran Into the Ocean at Night.—Down on Long Island, N. Y., a man was hurrying home with his car,

and while going down an incline covered with snow and ice, he lost control of the machine and it skidded off into the water, a considerable distance. There was intense darkness, and after standing on the seat of the car and calling for help for some time, and receiving no response, the occupant finally stepped into the water and began to wade aimlessly about in hope of finding a landing, lighting matches as he went. He finally came to a row-boat. There were no oars in it, but he paddled a quarter of a mile with his hands, until he struck a fence protruding out of the water. He then pushed himself along with the aid of this, until he found solid ground. Half-frozen to death he walked to his home reaching there sometime in the morning, about as much dead as alive. The automobile was recovered in a day or two after when the tide was low.

An Old Story.—While descending a steep hill near Newark, N. J., the driver lost control of the car as it rounded a curve. It dashed against a telephone pole, breaking it, and throwing one man out with a broken neck. The two other occupants were hurled several yards, but beyond a few broken bones and internal injuries they were not seriously hurt. Of course, the accident was entirely due to carelessness, as the car itself was in perfect condition and could have been easily handled if proper speed had been observed.

In a Driving Rain.—In Washington, D. C., a lieutenant in the army, while crossing the street, was prevented by a driving rain from seeing an automobile, and was knocked down, and the wheels passed over his chest, breaking his legs and skull. He did not live long. The driver of the car claimed that he was going at a slow speed, but the police have learned that a storm cover was across the front of the car when the accident happened, so that the driver could not see ahead.

Arrested Fourteen Times.—It may not be exactly applicable to this department, but there is a lesson, nevertheless, in the fact that Jack Johnson, the champion negro pugilist, has been arrested fourteen times for automobile speeding. He has been in more mix-ups with the law in the past year than any one else, either famous or infamous. The lesson of all this is, that knowledge of running a car is of very little account when recklessness is at the wheel. While if a man were inclined to be scrupulous and to observe the ordinary rules of society he would not be a prize-fighter. It is worthy of note that Johnson has never injured himself in any of these escapades and this is to be sincerely regretted.

A Race and Death Won.—In Rockville, Conn., a man and his wife in a car and one passenger tried to cross a railroad track before the arrival of a train. The passenger on the rear seat yelled and tried to have the driver stop the car, but as this was impossible he sprang from the seat and escaped with several cuts and a lame back. The driver, however, put on high speed, but one of the cylinders began back-firing, and the train struck the automobile squarely, throwing the man and his wife out. The man died three hours later, and there is not much chance of his wife's recovery. The railroad tracks have long been considered a source of peril to highway travel, although this was no excuse for the accident, as the man was warned of the danger.

Caused by Adjusting a Lap Robe.—A big touring car was overturned near Augusta, Georgia, and several women occupants escaped death by almost a miracle, although they were all more or less bruised.

It appears that while driving, the chauffeur attempted to wrap a rug about one of the ladies without stopping the car. While doing this, he abandoned control of the wheel, and before he could regain it, the machine ran into a ditch, throwing the occupants out and smashing the car into kindling wood.

The Brake Snapped.—In Richmond, Va., a party of city officials were attempting to turn out of the way of a trolley car when the brakes snapped. The emergency brake likewise broke, and the car took the sidewalk. Fortunately not much damage was done, although a young woman escaped being run over by about the thickness of a piece of cardboard.

An Old Story.—In Minneapolis, Minn., a speeding automobile, driven by a man whom the police are exerting every effort to capture, struck a man as he alighted from a car, and hurled him thirty feet into the fender of another car. The automobile driver escaped, and the victim may not recover.

Cartercar Lands Big Order.

An automobile sale which established a new record was closed by the Cartercar Company at the Detroit Automobile Dealers' Association Show, held in the Wayne Hotel gardens. An order was signed by a Battle Creek cereal company for twenty-four Cartercars of the new Model "H" \$1,150, touring car type, all of which are to be delivered at once.

Instead of being equipped with the regular type of body, the cars will be fitted with a specially constructed body, built in the exact shape and proportions of a package of Toasted Corn Flakes, only several hundred times larger. This huge box will then be painted in the well-known green and red tints of the standard package.

The automobiles form a part of the new newspaper advertising campaign which is being worked out by these people for 1910. The cars will be sent to every city of any importance throughout the entire United States. From them will be distributed sample packages of goods.

Correct Air Pressure.

In order to let the car owner know what pressure there should be on tires, the Firestone Tire and Rubber Co. has prepared the following table:

Size. Inches.	Wt. per Wheel. Pounds	Air Pressure Recommended Pounds
28 to 36x2 1/2	225	40
28 to 36x3	350	50
28x3 1/2	400	60
30x3 1/2	450	60
32x3 1/2	550	60
34 and 36x3 1/2	600	60
30x4	550	75
32x4	650	75
34x4	700	75
36x4	750	75
32x4 1/2	700	85
34x4 1/2	900	85
36x4 1/2	1000	85
36x5		90

Weight are for cars unloaded.
For weights exceeding 1,000 pounds per wheel 5-inch tires and over are recommended.

Change of Name to Pullman Motor Car Company.

In accordance with the fact that the company has outgrown its local name, the York Motor Car Company, of York, Pa., recently applied to the Courts for a change of name, which has been granted, and the company will be known as the Pullman Motor Car Company, Inc. The officers and personnel of the new company remain unchanged. The change will harmonize more with the character of its output, and to avoid the confusion after the establishment of the plant at Evansville, Indiana.

THE REPAIR SHOP

REPAIR WORK.

Some Practical Hints for Doing a Few Awkward Jobs Easily.

Every development of engineering branches out to a greater or less extent in an independent direction to that taken by allied engineering trades, and motor car engineering is no exception to this rule. It is, therefore, not to be wondered at that motor car repair engineers have one or two special hints which may be of interest to the general reader, and a small selection of these is given below.

One of the awkward jobs which has occasionally to be undertaken in a car repair shop is the removal of a broken plug. This may be caused either by the brass

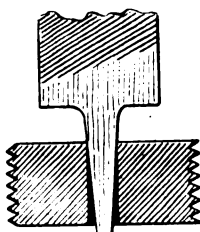


Fig. 1.

plug being very firmly fixed, or owing to the head having been wrenched off in trying to remove it. In such a case, the tang end of a file or similar tool will be found useful. A small hole should be drilled in the plug, and the tang end of a file should be driven tightly into the hole, the hardened end of the file being covered up while being driven in, as shown in the sketch Fig. 1. The file should then be gripped with the jaws of a shifting spanner, and while turning the file so as to unscrew the plug, it should be kept pressed down very firmly into the hole. This is very often a successful way of removing a broken plug, but the file must be driven in firmly before attempting to turn it; otherwise the hole will be reamed out.

Trouble is frequently experienced in taking the parts of a motor car to pieces, owing to the way in



Fig. 2.

which nuts and bolts become corroded up, because of weather conditions to which they are exposed. If, on applying a spanner to a nut, it is impossible to move it, because of insufficient leverage, another spanner may be applied as shown in Fig. 2; and an inaccessible nut can sometimes be got at with a box spanner, into which the next smaller size of box spanner has been fitted, as illustrated in Fig. 3. If the nut is screwed too tight, the application of paraffin may help to free it; and where the nut is in such a position that fire need not be feared, a little gasoline may be poured on it and lighted. This will have the effect of expanding the nut and freeing it.

A considerable amount of damage is sometimes

caused to a car by careless mechanics in a garage, because they do not use the proper means to grip the thread of a bolt firmly in the vice without damage. Lead or copper clamps are usually put on the jaws of a vice, but a better method of holding the thread is to obtain a nut which will fit the thread to be held and to cut it into halves from the front face to the back. The two halves may then be put round the



Fig. 3.

bolt, which when gripped in the vice will be firmly held without damage to the thread.

Possibly these hints will seem almost too simple to be put down in black and white, but experience has shown that a good many jobs have been ruined, and cars spoiled, because the mechanics and apprentices have not paid sufficient care to details such as these. From this point of view, therefore, it is hoped that the notes may be of use.

Putting Cylinders Upon Pistons.

It is not difficult to put a single cylinder back on its piston after it has been necessary to take it out, but it is not so easy when the cylinders are cast in pairs, it is difficult to "dodge" the rings into the cylinder barrels simultaneously. The job is greatly simplified by taking the precaution to place the cranks up and down, so that one piston is at its highest point and the other is at its lowest. This means that the pair of cylinders can be dropped straight over the pistons, the rings of the upper piston being guided into the cylinder before those of the lower piston are replaced. When it comes to dropping one of the mono-block castings of four cylinders on to four pistons it is still best to work this way, so that only one other pair of hands are required and that the two upper pistons may be guided into their cylinders first and then the two lower.

Use Soapstone.

A pneumatic tire becomes not warm, but hot, when driven rapidly for any length of time, caused from friction or contact with the surface of the road, and this heat is sufficiently great in many instances to create a vulcanization between the inner tube and inside ply of the casing, unless the tube or casing has been thoroughly soapstoned. A wise precaution would be to soapstone liberally the bead of your casing before putting it on the rim, as this will, in a measure, prevent the rust of the rim coming in contact with the bead and preventing its ready detachment when desired. Particularly is this precaution essential when applying an old or repaired casing.

For Work by the Feet.

Motorists who experience difficulty in holding their feet in constant juxtaposition to the clutch and service brake pedals—particularly if the latter are of the push pattern—should take pains to provide themselves with little wooden blocks of just the right size and shape to provide an adequate support for the boot heel. It happens not infrequently that the foot board is given an inconvenient slope, which, taken with some shortness of limb on the part of the driver, makes comfortable driving and a safe driving position incompatible.

PISTON RINGS.

Something About Their Lapping, Fitting, and Excessive Pressure.

Scarfig or half-lapping the joints of piston rings has never been found by steam engineers to pay for the trouble involved, as the leakage through a narrow slot is very slight, and checked only in a small degree by scarfig alone.

Fig. 1 illustrates an excellent design which is better able to hold compression after lengthy service. Any advantage arising from boring rings eccentrically is discounted by a deeper annular channel in the piston

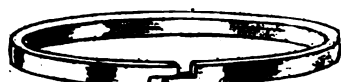


Fig. 1.

and unequal wear of the edges, due to diminishing surface, and there are makers of repute who ignore this point. When a ring fits the bore the radial pressure needs to be very slight, as it is heavily increased by the gas which passes inside. Even when a ring is a little slack edgewise in the groove, there must be—except when the piston is changing stroke—one edge or the other in contact which checks escape.

The cylinder bores of marine engines are often worn larger at the ends by the inrushing steam at maximum

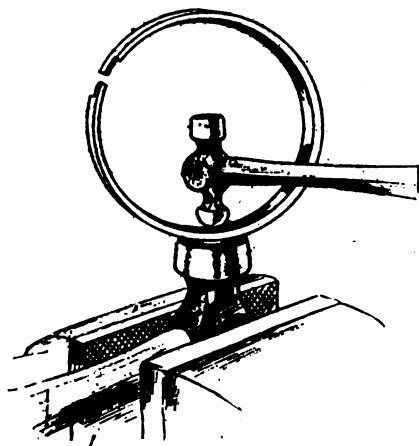


Fig. 2.

pressure penetrating inside the ring and expanding it with undue force. Means are often taken to prevent this by restraining the ring from opening too far—a practice generally favored by the navy. In large steam engines leakage is minimized by opening twin rings axially as well as radially, and the idea carries several patents.

The subject has received much careful thought from steam engineers, and it has long been recognized by

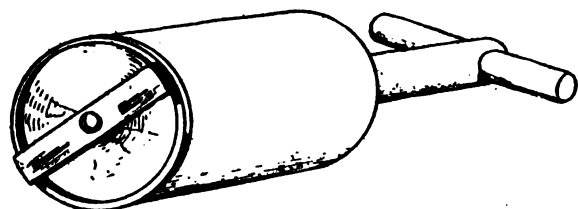


Fig. 3.

them that no type of floating ring without frequent axial and radial adjustments can remain tight under working conditions. Also, that excessive radial pressure can be a greater evil than leakage, and experience has also proved that a highly glazed cylinder bore is doubtful evidence of minimum friction. In the merchant service, when a packing ring is adjusted to sus-

tain its own weight in the cylinder, it is considered to be sufficiently expanded.

Now, if steam-tight pistons be of paramount importance in marine engines, they should be still more so in petrol motors. Steam which has escaped past the high pressure and intermediate pistons can still do useful work in the low pressure cylinder, but the gas which has passed the piston of a motor is as the water in the tail race of a mill. Moreover, the loss by leakage past a small piston is greater relatively than that past a large one, in inverse proportion to the squares of their diameters.

Should a motor cylinder be worn unequally it is clear that no ring can fit well, but serviceable rings are often scrapped because they show a black mark on the outer surface. To these, with a little care and patience, a new lease of life may be given.

Set a hammer face upward in the vise, stand the

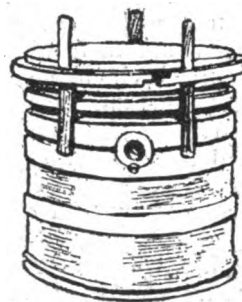


Fig. 4.

ring on it, and, starting from the middle, tap inside with the peen (nob) of a light hammer, gradually reducing the force of the blow as the slot is approached. It is better for the ring to be in the cylinder while doing this, but more difficult to use the hammer. If skillfully done, a ring may be stretched to reduce the slot, and expanded to restore the spring. Then a trial in the cylinder and a few artistic touches with a file complete a ready and cheap improvement. The value of the popular emery-grinding process is questionable, as it wears the edges of the rings and the sides of the grooves, especially when done with a twisting motion, as the ring seldom turns with the piston.

When fitting a new ring into an engine, the ends—or landings, to be technical—should be left so that the edges overlap slightly when the ring is in the cylinder. Then make a plug of yellow pine an easy fit in



Fig. 5.

the cylinder and square one end. Lay the ring on this end with a small batten across secured by a screw through the center, but not holding the ring tightly. Smear the bore as evenly as possible with a little vermilion and lubricating oil mixed to a paste, and move the ring to and fro in the cylinder while held square by the plug. Generally, it will be found to bear hardest at each side of the slot. File such places carefully with a 6-inch smooth file, try in again and continue. When the ring fits fairly well all round, the overlap of the ends should be absorbed; if not, file them until the edges have about 1 mm. clearance when the ring is in the cylinder.

If the ends of the rings be hard butted against one another when in place in the cylinder they may be buckled by expansion when hot, and make starting a two-man job.

Cleaning Cylinders.

In caring for the car when not in use in winter it is not advised that the cylinders should be washed out with kerosene until just prior to reuse in the springtime, but by copious doses of lubricating oil insure that cylinder walls and pistons are well coated with oil.

Drain out the base chamber, leaving the taps open, or the plugs out, so that sediment may gradually find exit.

As regard accumulators, it is better to discharge and recharge them, say once a month (discharging to 3.8 volts or so by means of a small lamp), while not in use, rather than the alternative, *i.e.*, draining out the acid and swilling out with clean water, for they are then available immediately they are required in the spring, and the otherwise necessarily careful recharging is avoided.

Retiming a Twin-Cylinder Engine.

In retiming a twin cylinder engine fitted with a Bosch high tension magneto you should have the points of the contact breaker just about to break with the piston on dead center. Of course each engine and magneto has its individuality as a combination. Some will stand a slight advance or a slight retard with advantage, but if you set the engine as stated to start with, you will not be far wrong. Of course, any variation of the position can only be satisfactorily managed by trial on the road. If you find the engine a little sluggish when you get it on the road, you can give it a very slight advance. If, on the other hand, you find it inclined to knock before the engine speed has fallen low enough, you can retard it slightly.

Note the Front Wheels.

If your front wheels get out of alignment they are liable to spoil your tires in a half-day's journey. When the wheel is out of alignment it naturally wabbles and that wabbling creates a friction between the tire and the road exactly the same as if emery paper was used on the tires. It has the effect of wearing the facing or tread on the tire flat, leaning to the side and not directly in the center of the tread. A driver can detect this condition to his front wheels while sitting in his seat, for he will notice immediately the necessity for "steering" in order to keep his car going straight, as the tendency is to go to one side or the other, according to which side the wheel is on that is out of line.

Leaky Induction Pipes.

Who will devise some simple method of ascertaining when induction pipes are leaking. Of course, if the leak be sufficiently serious it is always found out by the extreme difficulty in starting the engine, but any leak in the induction upsets the nicety of the adjustment of any carburetor, although it does not make it impossible to start the engine. It is easy enough to find a leak in the exhaust joints, as this can usually be heard, but even if it cannot be heard the leak can be quickly detected by a little oil around the joint and watching for bubbles as soon as the engine is started, but neither of these tests are any use for the inlet joints.

Heating of Tires.

There are two common causes of excessive heating of tires: (1) The wheels may not be running parallel, so causing undue friction. The remedy is obvious, and the defect usually easy to discover. (2) The springs may not be suitable for the load. Some cars "hold" the road much more closely than others. Where springs are unduly stiff the wheels are apt to bounce off the road, and excessive friction is set up on their

coming into contact again. This shows itself in violent axle movement and is a frequent cause of heavy tire bills.

Rain Stains on Bonnet.

When a car has had a run in heavy rain, particular attention should be given to the bonnet, as after a long run the bonnet becomes fairly hot, and if the rain drops be left to dry upon it they will stain far more than they will upon the body or wings. If circumstances do not permit of the car being washed down at once, the precautions should always be taken of sponging off the bonnet, putting on dry rags to take up the moisture; otherwise it will spot so badly that it will never look smart again until it is repainted and varnished.

A Cold Seat.

The front seat of a landaulet or a limousine is far colder than that of an open car; this is due to the glass immediately at the back of the seat, which acts as a wall against which the wind drives, so that the backs of the occupants of the driving seat are in a constant chilling current of air. Directly the front windows of the landaulet are opened this cold bank of air is dissipated, but, of course, in really cold weather the front window of the landaulet cannot be opened, so that the occupants of the front seats have to shiver.

Spots on Varnish.

The following is recommended to remove spots on varnish: Well rub in linseed oil (boiler for preference) with a soft rag until all the spots have disappeared, afterward removing all superfluous oil and polishing with a clean soft cloth.

To Start On the Spark.

In order to start the motor on the spark it should be speeded up just before stopping by opening the throttle wide. Then if the spark is cut off a full charge is left in a cylinder to be ignited when another start is to be made.

Hot Water Jackets.

If the radiator is cold and the water jackets extremely hot, the water is not circulating, owing to a pump stoppage or an air lock. Over-heating often causes pre-ignition.

A nut that resists every attempt at getting it loose usually becomes more docile after it has been heated for several minutes. This can be done with a torch or by holding a hot piece of iron against it for a while. This will cause the nut to expand slightly and make it easier to come off.

To clean and preserve aluminum surfaces go over them with a stiff bristled brush with a solution of from five to eight parts of water to one part of sulphuric acid. Then apply vigorously a mixture of fine emery and turpentine with the same kind of brush.

A periodical examination of the gears should be made from time to time to ascertain if on all speeds—forward and reverse—the teeth of the gears and the dogs mesh home as they should do.

Headlights should be set to throw the light straight ahead, not pointed down at the road at an angle.

TRouble DEPARTMENT.

Questions answered by the Y. M. C. A. Automobile School, 823 West 57th St., New York.

This department is intended to be a "trouble clearing house," and it will be esteemed a favor if our readers will add information to it from their own experience or knowledge.

Better Not Do It.

Question:—I am thinking of increasing the wheel base on my two-cylinder, opposed, under the body engine, and think this can be done by bringing the front axle forward to the front of the radiator. It is now located eleven inches back, and by doing this I can make the wheel base ninety-five inches instead of eighty-four inches as it now is. Now I wish you would tell me how I can do this in a very economical way and at the same time do a substantial and good-looking job. The car is an old model Wayne and I anticipate that I will have to cut the frame extension off that protects the front of the hood, surmising that full elliptic springs will have to be substituted for the ones now in use. I do not know what style of spring they are; can only say that they resemble the lower half of a full elliptic spring which is shackled to the frame on both ends. I hope you can recognize them by this description. I wish you would go into this at some length, as I believe there are quite a few who would be interested in what you say in regard to this change. Also tell me what size springs to use and advise me if it will be necessary to change the back springs, as they are now like the front ones. The car weighs about 1600 pounds. What changes will have to be made with the steering gear and how? Please tell me what I should first do, and then give me it in one, two, three order, so that I may work intelligently and with clear understanding.

Answer:—Although it would require several illustrations and considerable space to reply to the above, we would be glad to do so if we thought the proposed change was desirable or practical. But it is not. And even if it could be easily done, the results would be hardly recognized in its riding quality.

Lubrication.

Question:—I desire some information through your columns with reference to leaking grease from rear wheels. I have a seven-passenger car (Stoddard-Dayton) which in every respect has been satisfactory except leaking grease over brake bands and wheels. If I use KOOO non-fluid oil made by the N. J. Lubricant Co. I notice but little leak, and then only after I have run the car four or five hundred miles. Do you think KOOO non-fluid oil too stiff for differential and rear axles during the summer months?

Answer:—A heavy oil or very light non-fluid oil is the proper lubricant for most differentials. There should be no difficulty experienced ever with light oil, if the housing is kept only $\frac{1}{4}$ full. This is sufficient, as the large gear will dip into the oil and carry it to all of the other gears and at the same time the lever will not be high enough to cause it to leak through the axle housing.

Clutches.

Question:—Your trouble department interests me very much and I would like to ask you about the low speed clutch on my Ford model "N," which slips on the heavy grades and sand that I have to negotiate. I re-lined it with the fibre that the makers furnish, which helped, but as soon as a little grease from

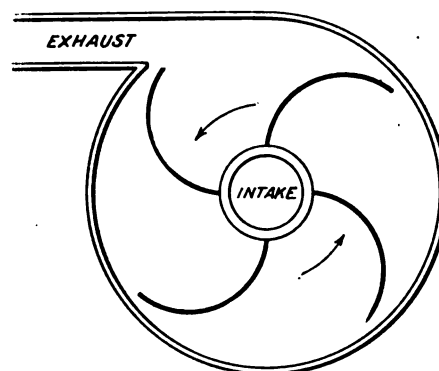
transmission case gets under it and I come to a hard pull, I experience the trouble again. Are the clutch compounds as a rule a solution to the trouble, and can you suggest a lining that will hold what my motor will pull?

Answer:—We know of no compound that is good for fibre clutches, but if the fibre is shaped so that it fits the drum well it should hold without trouble. A camel's hair or asbestos brake lining, which can be bought at any automobile shop, has remedied this difficulty before, and if either of these linings are used and the clutch properly adjusted, it will hold all of the power your motor will develop.

Radiator Heating.

Question.—I am the owner of a Ford Model "N," and am bothered with radiator heating up on very short trips. The pump is in good condition and the radiator hose is new. Will you please tell me through your trouble department what can be done to overcome the trouble?

Answer.—When new hose is put on the timer, coating of rubber is sometimes forced inside of the pipe,



instead of outside, thus causing a clog. Disconnect the radiator; pour water in the filler pipe, and see if it runs out freely at the bottom. If not, the radiator is clogged and will need cleaning. Does the pump vane revolve in the right direction? It has happened in other cases that the vane was removed for inspection, and replaced so that the arms were shaped wrong for the direction of rotation. The vane should revolve as per cut.

Four Live Questions.

Question:—1. How do you test for a leaky valve and tell from piston leak?

2. Why will an engine run and yet fail to drive the car?

3. What is the remedy for a friction or a multiple disk clutch "biting"?

4. What would you do to a cam where you had found that your engine would deliver more power if exhaust valve opened earlier and exhaust valve cam was keyed to cam shaft in a fixed position relative to opening valve. Could you braze a piece to side of cam causing earlier opening and how could it be done?

Answer:—1. You can take off manifold and listen for hissing sound. The best way if in doubt is to remove the valve and examine for black streaks running across the seat.

2. If engine trouble it might be very poor compression, an imperfect mixture, a weak spark or poor lubrication. All of these might allow the engine to run with no load but would not let it deliver sufficient power to pull the car. If in perfect running order it cannot drive the car if the emergency brake is not

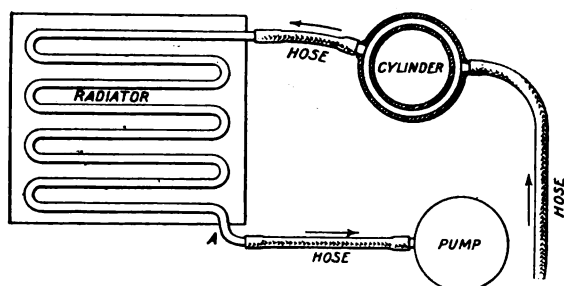
released, if a bearing has frozen up or if any one of a dozen other things are wrong with the car itself.

3. If the clutch is run in oil, use a heavier oil and plenty of it. If run dry, lubricate with a little light oil.

4. A properly shaped piece brazed on to the cam would do the work, but it should not be attempted by any one except an experienced mechanic.

A Boiling Radiator.

Question.—Should the outlet elbow on an auto radiator be as large as the tubes in the radiator? The tubes in my radiator on Northern two-cylinder ($5\frac{1}{4} \times 5\frac{1}{4}$) car measure about $\frac{1}{2}$ inch, and the outlet elbow, A, on the bottom of the radiator measures considerably less, or about $\frac{1}{4}$ inch. I have trouble, more or less, all the time on account of the water boiling and steaming in the top of radiator as it comes from the cylinders, and I note the outlet at bottom is at the same time, almost cool to the touch. Would it increase the flow of water to the pump, and increase the amount and speed of the circulating water to make the outlet fully as large as the radiator tubes? If this



Sketch of the connections showing the small outlet at A.

would not correct the trouble, would the use of a larger pump increase the circulation of the water and prevent boiling? There are no stoppages in the pipes and the hose connections are new. The radiator has always boiled and steamed, and caused me no end of trouble, except under the most favorable conditions of running. Would appreciate very much your advice. (The radiator is not stopped up.)

Answer.—It would seem from your diagram that you have located the trouble. Elbows should be as large or larger than the rest of the piping system, in diameter, as their shape alone causes resistance to the passage of the water. However, the pump should be examined closely for any wear that will allow leakage. If the gasket on the face plate of the pump is too thick it will make a small space in the chamber, through which the water may leak back and thus lower the efficiency of the pump.

Warming the Engine.

Question.—I have a Searchmont touring car which gave good satisfaction during the warm weather, but since winter has set in, it refuses to. I warm the carburetor with hot cloths before starting, when it will run all right. In a few moments, though, a coating of ice forms over it, which brings everything to a standstill. What is the best remedy?

Answer.—It is necessary to get warm air to the carburetor and the best way to do this is to place a sleeve of tin about 6 inches long around the exhaust pipe, leaving about $\frac{3}{8}$ inch clearance all around. From a hole cut in the middle of this sleeve, run a pipe to the main air inlet of the carburetor. Air can then enter the carburetor only through the ends of the

sleeve and so must come in contact with the hot exhaust pipe and it will be heated sufficiently to overcome the difficulty.

Analysis of a Kick.

Question.—I drive a Ford Model "T." I find that with the spark lever in a certain notch with battery in use, a kick will occur on cranking, while with the spark lever in the same notch with the magneto in, there is no kick. Will you please explain why this difference?

Answer.—As the sparks from the battery and magneto are controlled by the same spark-timing device, there is only one solution that suggests itself. With the lever at the notch mentioned, the spark probably occurs slightly before dead center, but in cranking the motor the armature of the magneto is rotated slowly and consequently delivers a weak spark. The combustion of the gas is, therefore, slow and the crank will pass the dead-center point before its pressure is felt. Not so, however, with the spark from the battery, as this delivers as large a spark at low speed as high and the gas will expand sufficiently before the crank reaches center to cause the kick back.

Leather Finish.

Question.—Please advise me if there is a blacking made that will permanently blacken leather. I have a Pierce-Arrow car, the leather is buff, and I want to blacken it. I have tried something advertised, but it peeled off in less than a month, although it was guaranteed, and made the upholstering look worse than before.

Answer.—There is nothing that will permanently make buff leather black or black leather buff, after the leather has been manufactured and put to use. The manufacturers themselves, of leather, have difficulty enough in doing this under the best conditions of treatment. There are preparations which if applied to the surface of leather will stand some wear and very much improve its appearance, but all kinds and processes of paint and enamel will wear more or less, and the person who will invent something that can be applied with a brush or otherwise easily, and be "permanent" has a sure fortune in hand.

Better Stick to Gasoline.

Question.—I have a four-cylinder gasoline car, but am thinking of making a change as I want a five-passenger car and mine is only a three-passenger. What do you think of a White steamer for country roads?

Answer.—Although the White steamer is all right for country roads, you had best stick to gasoline cars. They can be started far more quickly, they require less care, they are more economical in fuel, they need fewer expensive replacements, and they are less expensive than steam cars.

Radiators, Starters and Engines.

Question.—What is the best thing to do to preserve a radiator? Would it be a good plan to paint same, or put some kind of oil inside when put aside for a time to prevent rust? Or do both, or anything else? Is the Garr engine starter, put up by the Gardner Starter Engine Co., the only starter on the market? Are all automobile engines rated as to h. p. by a ratio of three to one? That is, the engine alone would develop one-third of the rating if used in the same way a stationary engine would be.

Answer.—1. A very thin coat of paint applied to

the outside adds to the appearance of radiators, but as they are constructed of brass there is no danger of them rusting.

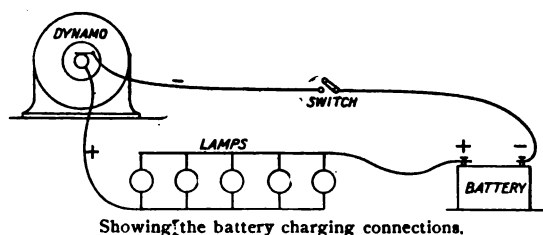
2. No.

3. The h. p. of gas engines used in automobiles is usually taken at 1000 ft. per minute piston speed. This is a somewhat higher speed than stationary engines run at normally, and as the speed of the engine plays an important part in the power developed, an automobile engine of a given h. p. would not give its rated h. p. if run at the speed of the majority of stationary gas engines. We do not know, however, that there is a fixed ratio in use.

Charging a Battery.

Question.—In your repair notes, if you get the space, will you answer this? How to proceed to charge a six-volt 60 A. H. storage battery with a Platero dynamo that gives about 10 volts? How long will it take to charge it? My volt meter gives only six-volt reading. If I put in a six-volt lamp in the circuit and use my volt meter, can I do that? To wit, when the battery is fully charged and six-volt lamp in the circuit, the volt meter should read 2.5 volts. Am I right?

Answer.—The dynamo must give fully 10 volts to charge a six-volt battery, and should give three or four amperes. Connect the positive lead from the dynamo to the positive terminal of the battery. With one lamp in the circuit the battery could be charged, but very slowly. It is preferable to put enough lamps in parallel to allow 3 to 4 amperes to flow, and charge until the solution in the battery bubbles freely and then reduce lamps until only one ampere flows, and charge again until solution bubbles. Each cell should then register 2.5 volts, or 7.5 volts for all three cells. This will drop to 2.2 volts per cell shortly after charging is discontinued. If you don't know the amperage of the lamps, but do know the wattage, watts divided by volts will give the amperes. Connect lamps in parallel as follows :



Exhaust Pressure.

Question.—Please to tell a subscriber of Automobile Dealer and Repairer about how much pressure is still left at end of stroke just preceding exhaust, in say a 4x4 four-cylinder motor. In other words, under what pressure (about how much) in ordinary running does the gas escape into air? It must be considerable, as witness the frightful noise when there is no muffler.

Answer.—This pressure, of course, varies greatly, but in engines that compress to 65 or 75 pounds per square inch, as the majority do, the initial exhaust pressure under average conditions will be 80 to 90 lbs. per square inch.

Too Expensive.

Question.—I want to build a fast, high-powered roadster (60 horsepower) double side chain drive, four speed selective transmission, cone clutch. I want nothing artistic—just an engine on a frame and

wheels with a steering wheel. The engine to be first-class, the remaining parts second-hand. Wheels 36 inches, wheel base, 115 inches. Could you estimate an approximate cost?

Answer.—It is doubtful if you could buy a 60 horsepower engine, and the cost would run from \$2000 to \$10,000 for the proposed car. Better not try it.

Large Tires.

Question.—I have ordered a car weighing about 2400 pounds with 34x3½ inch tires. Would it be economy to pay the difference and have four-inch tires? Would larger tires wear longer and be less liable to blow out and puncture?

Answer.—The answer to both questions is yes; although the economy would not be important, considering the slightly increased cost and a possible slight increase in the propelling force of a large tire over a small one. On the other hand, large tires ride easier than small ones.

Winton Valve Control.

From W. O. Staples, New Jersey.—In the January number one of your subscribers asks a few questions concerning the inlet valve control on a Winton Model C. Owning a machine of that model, and having done considerable experimenting upon it, perhaps the results obtained may be of interest to him or others possessing the same machine.

In the first place, the air system of the inlet valve control has long since been discarded by the Winton Co., which indicates clearly that it is a thing of the past. In my case, I found that it was, to say the least, a nuisance, because the air system of a machine that has been used a few years is very difficult to keep tight owing to the numerous pipe connections, worn inlet valve, plungers and foot accelerator. The removal of the entire air system, and the substitution of the common butterfly valve in the intake pipe from the carburetor proved a very simple matter, and the governing of the quantity of gas to the cylinders became far more positive and efficient than formerly.

Concerning the advisability of installing a system of mechanically operated inlet valves in place of the automatic, it is my opinion that the work and expense necessary do not warrant the change, considering the slight increase in power that might possibly be gained thereby.

Although I had already made the cams for mechanically operating the valves on my machine the idea was abandoned after studying the several phases of the question. The Winton Model C weighs fully equipped about 2300 pounds; add to this the weight of four passengers, averaging 140 pounds each and the total is 2860 pounds. The cylinder bore of the motor is 3½ inches and stroke 5 inches. The long stroke necessarily means a comparatively slow speed engine, so it is clear that any great hill-climbing qualities are out of the question with a motor of the above dimensions and a load of over 2800 pounds. Your correspondent should, therefore, not expect to compete with the later design of cars which, having the same bore would doubtless have a much shorter stroke and higher normal speed, with far less weight to propel.

The long stroke of this motor enables the cylinders to receive good charges of gas on the suction strokes at normal speed, provided the inlet valve springs are not too stiff, and the pistons and rings are a close fit. The only possible advantage to be gained by instituting mechanically operated inlet valves would perhaps be to insure the same valve opening regardless of engine speed. This advantage would manifest itself,

for instance, on a long grade, where the car is gradually diminishing in speed as is also the motor, hence the size and duration of the valve opening is becoming less and less and the charge drawn in the cylinder is smaller at exactly the time when it should be the greatest. Whether a very appreciable gain in power would be noticed at such a time with mechanical valves is doubtful.

It is true that the mechanical valve having a positive opening at all speeds would also have a longer duration of opening. The Winton C motor closes its exhaust on the upper dead center, so that the inlet cam for mechanical operation might lift the valve at, say, 3 degrees beyond that point and close at 15 or 20 degrees beyond the lower dead center, giving a range of about 195 degrees for the suction stroke, as against a possible maximum of 175 degrees with the automobile valves. The objection to increasing the quantity of mixture at each stroke to such an extent as shown above is, that the compression space in this motor is very small, and the compression pressure correspondingly high, so that an increase in this pressure by admitting more gas would not only generate more heat, which would have to be radiated by the cooling system, but might possibly be dangerous, as the cylinders and pistons were not designed for such a pressure.

ANOTHER VIEW.

From M. O. Wilson, Maine.—I would like to say a few words to help your correspondent out of his troubles with his Winton machine, as I am the owner of one and have experienced all his trouble and some more.

The first thing that I did was to reverse the differential so as to bring the sprocket wheels out of line. Then I put in two sprocket wheels on a counter shaft (one with 14 sprockets, the other with 21), hanging them under the frame about half-way between the drive shaft and the rear axle, reducing speed one-third, and getting one-third more power by using two chains. That gave me all the power that I needed (we have hills here). Then I took out the air pump and all the piping, plugged up the holes and took the air valves out of the carburetors and sawed a slot in the carburetors below the sieves, putting in sliding valves and arranged them to be operated by the same foot button that operated the air control and my engine trouble was over.

There should be no trouble in grinding the valves in so there can be no leakage. The air control has nothing to do with the power of the engine; it simply governs its speed. I do not think it will do to put a 30 h. p. into his machine, unless he is satisfied to run at the same speed as at present. He does not seem to understand that the strain on the gear and differential will increase, according to speed; there is less strain when on low gear.

The strain will be double at fifteen miles per hour to what it would be at ten, and about four times as much at twenty.

Perhaps I can help him more in a personal letter. Will be glad to do so.

ANOTHER VIEW.

From C. L. Bailey, Michigan.—I note the difficulty that our friend is having with his 1905 Winton, as given on right hand column of page 441 of the January number of your journal. My recollection is that the Model C Winton of '05 was a double opposed motor, and upon that supposition I am making reply. I owned a 1905 Yale—16-18 h. p.—automatic intake

valves and I can sympathize fully with our friend in his trouble, for those automatic intakes were the source of unending and constant trouble, but otherwise I liked the car and determined to keep it, and overcome the trouble. It was a little expensive, as it was a cut and try job; but I finally conquered, and am to-day running the car, and do not know what trouble is so far as the motor is concerned.

My final solution was to replace the original motor with a 20 h. p. Beilfuss motor, which I procured from the company at Lansing, Mich., and which motor is advertised in your journal. This motor, however, proved too strenuous for the old transmission, and I had to put in a new transmission. Had I known what to have done in the first place, this reconstruction and replacing of motor and transmission would not have cost me over \$225, including the work, and I realized something better than \$100 for the old motor and transmission, so it was not an expensive matter, had I started right in the first place, and was decidedly preferable to consigning the little car to the scrap heap. If this suggestion will in any wise tend to help out your subscriber and correspondent in his troubles with his Winton, I shall be pleased, as I will also be to give him any other or further information at my command.

Lathe Attachments.

From Donald A. Hampoon, Middletown, N. Y.—Not a few auto owners have a lathe, foot power or otherwise, and naturally wish to get the most out of it.

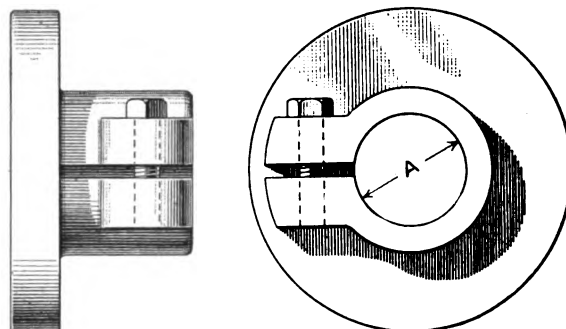


Fig. 1.

With a knowledge of the possibilities of the lathe and a few attachments, it is possible to do many jobs that are ordinarily supposed to come in the province of milling machine, shaper and drill press, and in connection with this latter, I am sending a drawing of a drilling plate.

As long as work can be held in the chuck and face plate, a dog and a drill held against the tailstock cen-

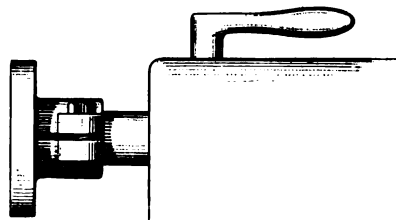


Fig. 2.

ter are sufficient. But when we wish to drill holes square, with some flat surface or the piece is too big to swing in the lathe, we begin to long for a drill press, and to alleviate this longing, I use the drilling plate shown. It is made of cast iron, is bored at A to fit snug on the tail stock spindle, then split and a bolt

put in. This makes a valuable attachment for any lathe. The size can be made to suit individual tastes or needs. This is a favorite "stunt" of practical machinists working in isolated plants where their only tool is a lathe.

Effect of Worn Bearings.

Question: I would like to know through your columns if the bearings in the crank case of a two cycle engine will wear and allow the engine to lose its compression. (In the Elmore, for instance.)

Answer: Yes, if the bearings in the crank case of a two-cylinder engine were worn to any great extent, the loss of compression would be very noticeable.

A Necessity and an Economy.

Benj. Briscoe of the Maxwell Car Co. says truly that sooner or later nearly every one will own a car, including, of course, thousands who could not afford to keep a horse. He adds:

"In going through some statistics recently, I discovered that probably 700,000 two-passenger buggies were sold every year. Ultimately all of these horse drivers will come to the automobile, because it is a simpler, safer and cheaper method of transportation.

"We are building for the coming season about 10,000 Maxwell two-passenger 12 horse-power runabouts, and this number added to what other manufacturers are building, will fall short of the demand.

"Still, if the people who are now using horses, not for pleasure, but for business, realize the economical advantages of an automobile, the combined output of all the runabouts made in this country tripled would not begin to supply the demand. To-day is the day of the moderate priced car. And people are beginning to realize more and more the necessity of an automobile."

Avoid Car Tracks.

Street railway tracks are made of steel and usually in "U" form. The tire, being wider than the track, rides only on the top edges, which, although not sharp, are compensated by the weight of car and passengers and eventually "chews" the rubber down to the fabric. After the fabric is exposed to the surface of the road, it does not require much driving to wear through every ply and thus destroy the casing even beyond repairing it.

To Detect Leaks in Induction Pipes.

Disconnect the fan by removing the fan belt, start the engine, and with a roll of brown paper, smouldering but not in flame, make a smoke test by holding the brown paper close to each joint in turn. If there be a leak at any one joint, the smoke will be noticeably drawn into the induction pipe at that point.

Speed Indicators.

You make a mistake if you do not have a speed indicator on your car, and one you can depend upon. A hard-working, honest speed indicator will show you how far your tires have run and thus help you to solve that perplexing question as to which make of tires gives you the "best run for your money." It will give you a correct line on how many miles your car will tour on one gallon or ten gallons of gasoline. Through the speed indicator you can keep tabs on your dry cells.

You can estimate how much gasoline you have in your tank without looking, because your indicator has already informed you how far you can travel on a gallon.

When following any touring book or touring map

the indicator is useful, because all automobile routes are surveyed with speed indicators and you cannot follow any route without one of these instruments to indicate to you the mileages.

As you pass through sections where the authorities are strict on the subject of speed your indicator can save you from arrest and consequent loss of time and money.

The indicator tells you at all times whether or not your car is up to its maximum speed on the level stretches.

If you buy a good instrument you will never drive without it, but if you buy some cheap and worthless affair you will waste your money. In two days you will remove it and throw it away, after which you will see no value in these extremely valuable attachments.

To Remove Tight Wheels.

Illustrated herewith are two methods of removing a wheel that is tight on its bearing or shaft. Of course, they are merely emergency methods, but either is far better than attempting to drive the wheel off by blows

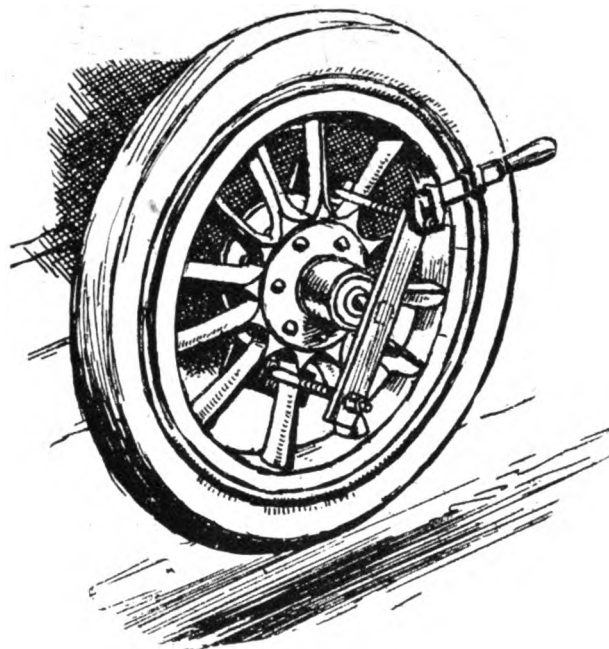


Fig. 2.

with a hammer on the brake drum or inner flange of the hub.

In the first method shown the materials required are: Two pieces of flat iron, each drilled with one $\frac{3}{4}$ -inch hole, one long piece of the same material drilled at each end, two long $\frac{5}{8}$ -inch bolts and nuts, and one piece of steel or bolt about 2 inches in length and $\frac{3}{4}$ -inch diameter. This latter should be interposed, as shown in the sketch, between the long iron plate and end of the axle. When the nuts securing the wheel to the axle has been removed, the outfit should be placed in position as shown, a performance often requiring two pairs of hands, and the nuts tightened with the fingers until the short stub bolt will hold in place. Then a wrench must be used, giving each nut a turn alternately. Unless the wheel be stuck badly there should be no difficulty in removing the wheel in this manner without necessity for using a hammer.

If, however, the wheel be stuck badly and tightening up the nuts merely bends the long plate, one or two sharp blows at the back of the hub as near the center as possible should move even the most stub-

born wheel. A similar method may be employed to "draw" a flywheel from a crankshaft.

The second illustration shows an alternative method which has been used with success on occasions when the details required by the first method have not been available. A length of stout rope, the car jack, and a

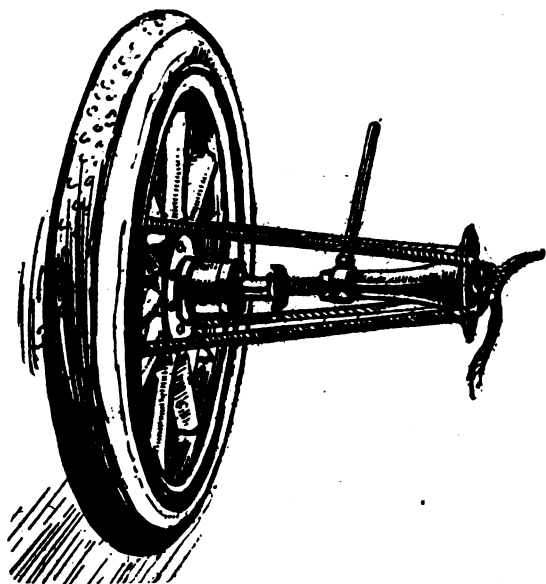


Fig. 2.

short piece of steel or a bolt, as before, are the only requirements. The sketch is self-explanatory, but, simple as the method is, it is none the less effective in the majority of cases.

THE STEAM CAR.

Some of the Good Points Plainly and Intelligently Stated.

One of the first arguments presented by the opponents of steam automobiles is that there would be a thousand manufacturers if they possessed any advantages, yet there are but three firms of any consequence in this country building steamers.

The fact that there are so few builders of steam autos in the United States and but one in Europe is a good point from which to begin a consideration of the advantages of the steam automobile. There would be other manufacturers and will be if there were other steam boilers available. So far but three forms of boilers entirely suitable for the modern automobile have been invented. When we have new forms of boilers which are strong, simple, powerful with the water level independent of position, or without a water level, we may expect there will be other manufacturers of steam automobiles. Up to the present time only three such boilers have been designed and constructed in the United States and as a consequence there are but three manufacturers of steam automobiles in the United States.

A boiler of this kind is a very difficult thing to design. Besides the three American designs there is one in Europe, making in all but four which are entirely suitable for the work. When the fundamental patents on these expire many more manufacturers may be expected to take the markets. This is thus not a point against the use of steam as a driving power.

Of the things which may be regarded as favorable to the use of steam, the first which comes to mind deserves special attention—the fact that it is noiseless. This is no small advantage though many of the gasoline cars of to-

day are practically silent. Yet the noise made by automobiles at railroad crossings has cost many lives by preventing drivers from hearing the approach of trains. Freedom from vibration is another admirable feature of the steam car. The power is applied in a practically continuous manner, the two cylinders give four impulses at each revolution, whereas, in even cars with two stroke engines, two impulses per revolution is considered good work, but in those machines using four stroke engines the impulses are more irregular.

This continuous application of power, for such it is practically, and its evenly graduated application in starting, makes the steam car very easy on its tires. Neither in starting nor in changing speed is there any jerk; the change of motion is regular steady progression. The motion is so smooth that the life of the tire is prolonged. This is a matter of record. This easy starting is greatly appreciated by passengers.

The motion of the steam engine controlled by the throttle, or link motion, gives an unlimited variation in speeds. Thus the steam car can in a crowded street follow the slowest traffic with perfect ease and for an unlimited time, and then without shock or jerk, it can start into its highest attainable speed without noise and with perfect certainty.

The certainty of the steam cars starting is a desirable feature. There is no cranking with the attendant undesirable features, of leaving the seat and the hard work.

The control given by the link motion includes all speeds both forward and back by a simple continuous motion of one lever is an advantage that should not be overlooked.

The steam car is smokeless under all conditions and is thus not liable to be held up in the public parks. The steam car is the acknowledged hill climber par excellence. Its records are at the top notch although it does not appear to hold all the hill climbing records, but this is because it has so often been barred from contests. The steam car stops and starts on the steepest hills without difficulty, and with no special care on the part of the driver.

The management of the steam car is exceedingly simple. The throttle and the reverse lever, speed and the direction of the movement, and everything else save the brakes is automatic. Both pressure and temperature of the steam are taken care of by the machine itself. It can slow down or stop and start again without interfering with the perfect action of the machinery. As a rule it can stop and stand for hours in zero weather and start again without trouble.

There is no changing of gears nor operation of clutches. For this reason the driver is relieved of the temptation to take chances where the traffic is crowded and at railroad crossings. It is no trouble to slow down for crossings nor for restless horses for the machinery needs no attention from the driver.

Contrary to general opinion the machinery of a steam car is comparatively simple. Instead of four, six or even more cylinders, steam cars use but two. There are no boxes of gears to wear or strip, and no complicated electric outfit. The absence of a carburetor is an advantage. Back-firing is unknown. The batteries, both dry and storage, and also the dynamos are entirely avoided and neither jump sparks nor make and break are needed.

It is claimed there is danger in sitting over steam boilers carrying high pressures. Yet it is not the pressure that makes a boiler dangerous, but the quantity of hot water it contains. The boilers of steam cars carry little water, so little in fact that a burst becomes only a mere puff, provided a burst were possible. The stories told remind one of the great explosions of 60 years ago when boilers carrying low pressures, 12 or 14 pounds, wrecked great buildings and when thirty-foot cylinders went sailing a mile or more through the air. It is the quantity of

hot water that produces the violence in an explosion. Some of these steam cars have only a few quarts of water in their boilers, none of them, we think, more than a gallon or two. Although the working pressure is high, the quantity of water is so small and the strength so great, that an explosion is out of the question. Prof. Carpenter of Cornell tested a boiler of a steam car to 7,000 pounds per square inch and only succeeded in making some of the joints leak.

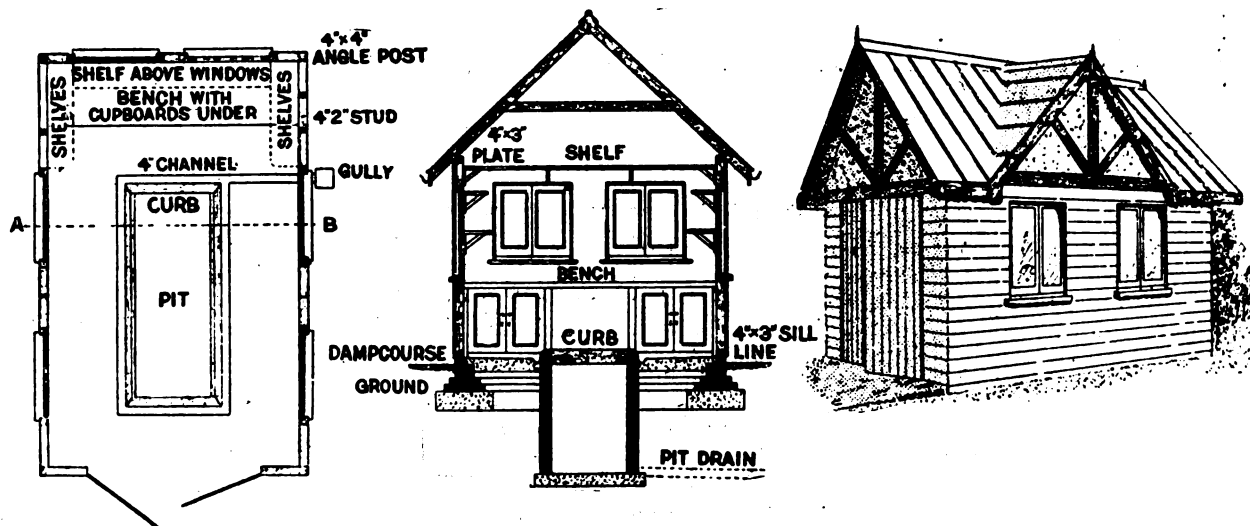
Pumps there are, and a multitude of pipes, and they do a multitude of things, and some people imagine they are too complex, but it is complexity of function and not of mechanism. Practically, as one writer puts it, one only has to "open the throttle and steer." There are a great many things taking place, but the driver is not concerned with them. And he is sure to get home from a journey. It may be further remarked that some of the steam cars are burning coal oil (kerosene) instead of gasoline for fuel. Kerosene can be obtained everywhere and cheaper than gasoline. It has, moreover, a greater heating value.

true, as far as it goes. But there are some decided drawbacks to steam cars that are of equal importance to their advantages. For illustration, time taken to get ready and to start; greater attention on the road and in the garage; extravagance in the use of fuel and water; necessity for the periodical replacement of the super-heaters; necessity for blowing off the boiler frequently if the water used is hard and dirty; necessity for more adjusting, repacking, etc.; expense of upkeep; disadvantages in making frequent calls and for short distances around town, and other points that no doubt have weight in making a choice between the steam and the gasoline car.]

GARAGE HINTS.

Suggestions That May Be Useful to Those Who Intend to Build.

The sketches shown here may be of some assistance to prospective garage builders, although, of course, it is not expected that any of them will fully meet



Figs. 1 and 2—Plan, elevation and perspective of a garage of modest dimensions.

This is a point of economy. When we come to the question of power for weight the steam car is not at a disadvantage. Moreover, with steam there is not an explosion within the cylinders and the working pressure may be almost anything from a pound per square inch up. Hundreds of pounds are used with perfect safety. The engines are usually compound and the economy is great. English figures show as many miles to a gallon of gasoline as in some gasoline cars.

There is one thing connected with the steam car that does not tend toward economy. Having an almost unlimited reserve of power, the temptation to run up hill at full speed is not always resisted. Hill climbing at best calls for power and to do so at the same speed one takes on the level consumes power and fuel correspondingly. If the hill be steep and short another enemy to economy comes in, the driver may "simple" his engine, immensely increasing the power but reducing the economy, by using steam with little expansion.

The actual operation of some of the steamers shows an economy equal and in most cases superior to the largest stationary steam engines.

With the modern condenser the water question is no longer of importance since water is continuously returned to the boiler and with some machines a vacuum is maintained.

With such an array of merits, certainly steam machines should be used more rather than less.

[Note by the Editor.—The foregoing is probably all

requirements, the ideas being suggestive merely. Figs. 1 and 2 show a wooden building for stabling a light car, and a more pretentious brick building is illustrated in Fig. 3, while a building for two cars, with workshop, covered washing yard and chauffeur's rooms, is shown in Figs. 4, 5 and 6. Of course, no prices except the approximate can be given.

Taking first the wood building, Figs. 1 and 2, this is proposed to be weather or match boarded outside and match lined inside, upon a frame-work of 4x3 inches for the sills, 4x4 single posts, and 4x3 studs. The internal dimensions are 16 feet by 10 feet, with a height to the eaves of 8 feet, and one end of the building is fitted with a bench with cupboards under and shelves above. Ample light is afforded by six casement windows, opening outward, and the entrance is by a sloped approach through a pair of stout framed, ledged and braced coach-house doors, 8 feet high and 7 feet wide. The building is erected upon brick walls, having Portland cement concrete foundations and a damp course—to prevent the moisture absorbed by the brick work from rising into the timbers—is laid over all the walls. The floor is of the same concrete, six inches thick, floated over with cement and sand, with a fall or slope in all directions to the channel pipes around the pit. When a pit is not made the interior should slope toward the door and approach. The sloped approach is similarly formed, the top end of the slope being level with the entrance sill and floor of

the house. It is proposed to cover the roof in this case with sheet zinc or Canadian pattern galvanized iron, and to fill in the gables with rough-cast and half-timber work, as shown in Fig. 2.

The pit, which nowadays is not at all essential in a motor house, is, in the smaller of the buildings shown, 8 feet long, 3 feet wide, and 4 feet, 6 inches deep, formed of $4\frac{1}{2}$ inch brickwork in cement upon

ing into the washing yard. The size of the motor house is 24 feet by 18 feet, and it is approached by the usual paved slope and entered through sliding doors, leaving a clear space of 15 feet by 8 feet, 6 inches. Other sliding doors lead into the glass-covered washing yard at the rear, which may be provided with a 10-foot pit. The accommodation for the chauffeur on the upper floor comprises sitting room,

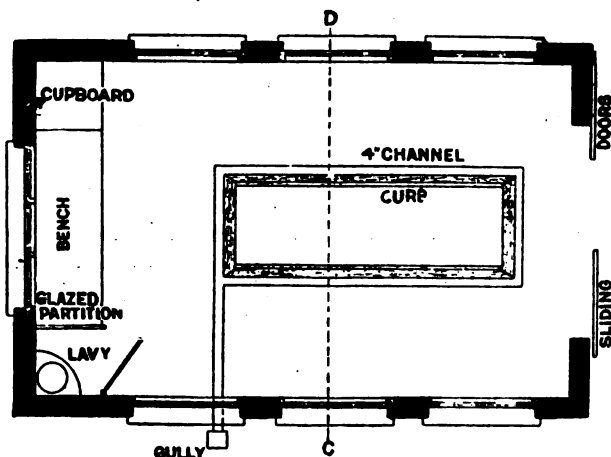
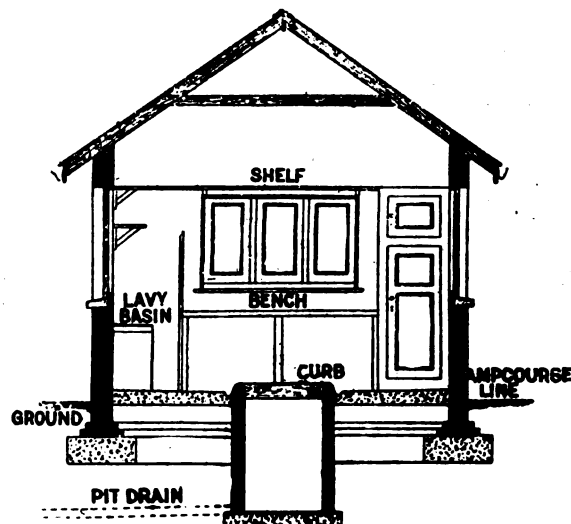


Fig. 3—Design for a garage for a large car.

a 6 inch bed of cement concrete. The inner faces of the walls and the floor are all rendered with a good coating of cement and sand, the latter falling to a pipe drain leading to a gully outside the building. Around the pit is run an oak curb, 7 inches by 5 inches, securely fixed to the brick-work and projecting 4 inches above the floor level, in order to prevent the car from "mounting" and falling into the pit. Outside this curb, flush with the floor, is laid a 4-inch channel pipe, discharging outside the house over a trapped gully. The longer sides of the curbing are rabbeted—as shown in section, Fig. 1—to receive the pit covers, which would be of wood in light sections, although this question of covers is one entirely for individual taste, there being no need for their provision at all when a curbing is used. Unless it is intended to wash the car inside the house, the curbing is optional, for a pit is so rarely used in connection with modern cars that the covering may not be lifted for months, and it is certainly a slight convenience occasionally to have a clear floor space uninterrupted by a projecting curb. The cost of this building as planned, constructed of the materials and in the manner specified above, may be roughly estimated at about \$500.

Fig. 3 shows a plan and section of a brick building, with slated or tiled roof, for stabling a full-sized car. Its internal dimensions are 20 feet by 12 feet, 6 inches, and the pit in this case is 10 feet long. There are six casement windows, three on either side of the building, and a large additional one to give light to the bench at the end. The doors are sliding, and when fully back leave an opening 8 feet wide and 8 feet 6 inches high. Bench shelving and cupboards are provided, as in the case of the timber building, but there is an addition in the way of a fitted lavatory basin. In other respects the building is practically the same. Its cost would be about \$1200.

Figs. 4, 5, and 6 are almost self-explanatory. The building is substantially built of brickwork, with upper portion rough cast and the gables rough cast and half-timbered. As the rear is a workshop, fitted with bench, cupboards, lavatory, etc., a door from this lead-



two bedrooms, bathroom, kitchen, and offices. The cost of such a building would run from \$3000 to \$4000, according to finish and fitting.

All the prices given must be allowed a ten to fifteen

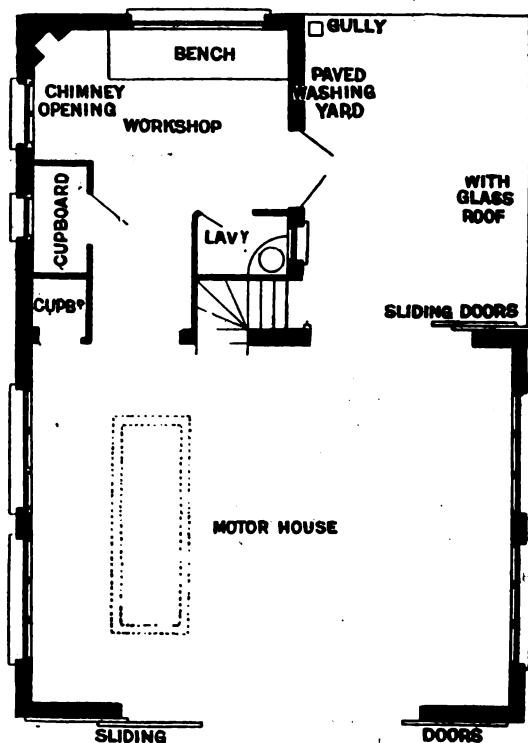


Fig. 4—Ground floor plan for a large garage.

per cent. variation either way, increase or decrease, the cost of labor and materials varying considerably with the locality in which a building may be erected.

The interior dimensions given in each case are not, of course, suitable for cars of all sizes. The length of the space actually available for the car or cars

should not be less than 5 feet, or preferably 6 feet, in excess of the overall length of the vehicle.

Thus, if a house of the first type were being made for a landaulet with 10 feet, 6 inch wheelbase, the

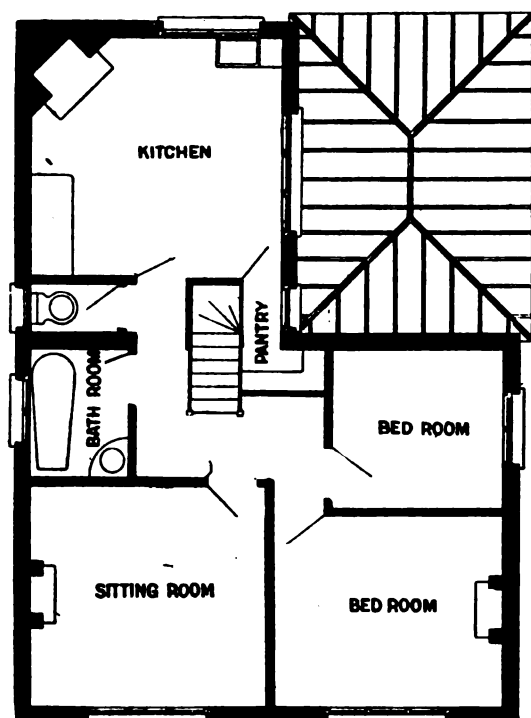


Fig. 5—Residential floor of a large garage.

length of the space from the inside of the door to the edge of the bench should hardly be less than 20 feet, for the overall length of such a car would be in the neighborhood of 14 feet to 16 feet, and allowance must also be made for lowering the hood and the additional space then required.

It is unwise to be illiberal in this matter of internal



Fig. 6—Perspective view of a garage and residence for the chauffeur.

dimensions, and especially with regard to length, for, although the first cost of the building may be slightly larger than the figures already given, the extra cost will be small compared to that of extensions, which might otherwise be necessary if a larger car be purchased at some future date.

Keep your tires away from oil and grease. If you must drive through either, wipe it off as quickly as possible with a piece of cotton waste.

Something About Magnetos.

In reply to numerous inquiries about magnetos, their life, overhauling and working, it may be stated that the life of a magneto varies considerably according to the amount of road vibration to which it is subjected, and also the work it has to do. The magnets are not likely to require remagnetizing under three years with 6,000 miles per year. There are plenty of magnetos in use on taxicabs and commercial motor vehicles which are doing from 50 to 80 miles running per day, or, say, about 25,000 miles per year, and they run quite easily for a couple of years. We have known magnetos to run five years without being remagnetized.

It is always better to entrust overhauling magnetos to the firm who manufacture them because they have skilled workmen who are interested in repairing the magnetos to the finest limit, and naturally can cause the machine to give the best results after repair.

As to how long the wearing parts of a magneto should last, is a question which is rather difficult to answer because the mileage varies so considerably. If the oiling of the working parts be carefully and regularly done and attention paid to the adjustment of the contact maker, much longer and better running can be obtained than if these essential points be neglected. Except that the platinum points of the contact maker may require renewal, there is no other part that is likely to require renewal for two or three years.

It is a good plan to have the magneto overhauled periodically, but unless it begins to give trouble, overhauling is not essential by any means. The most usual difficulty arises on account of the oil congealing in the winter time if not used fairly often, and on account of dampness.

A magneto can suddenly stop working under certain conditions. In some magnetos the small bell crank lever, which carries the platinum point serving for the make and break operation, may stick in its bearing, and thus the contact between the two points fail. This may be due to a slight swelling of the fiber bush caused by moisture or too much lubricating oil. This small matter is easily attended to. A sudden stoppage also might be brought about by water on the high tension terminal insulating piece, so causing a "short" of the high-tension current.

No harm at all will be done if the switch be left on, because the armature is stationary. Unless the engine is running no current is being generated by the magneto.

Tire Records.

George A. Peck of South Egremont, Mass., says: "I have a 1909 seven-passenger Berkshire car, which is made in Pittsfield, Mass., and which is fitted with Diamond tires. I ran this car 5,500 miles before I had my first tire troubles, and that was on the rear tire, and now the car has a mileage of 8,526 miles and the front tires have had no tire troubles of any nature. I have not had the tires off the rims, and they look as if they were good for 500 miles additional. I believe my success is due to keeping the tires pumped up hard all the time."

A Kansas man says he has been using a Model F Buick for the past 15 months, and in that time he has not had a bit of tire trouble or even a puncture; the tires have never been off the wheels, and have the same air in them as when the car was shipped. This car has been run through mud and snow and over all kinds of roads. The tires are Michelins and the distance covered about 3,500 miles.

On account of air contraction and expansion tires pumped up sufficiently on a hot day may be too flat in cool weather, and vice versa.

DRIVING AT NIGHT.

Why Reasonable Speed and Care are Called for After Dark.

On account of the many automobile accidents that have happened at night the Massachusetts Highway Commission has issued a statement setting forth the position and containing a warning to motor vehicle operators. The statement is as follows :

"A number of accident cases have been heard by the Massachusetts Highway Commission within the last few months which have made plain one frequent cause of great danger to both the automobilists and the public in general. That is the operation of automobiles when there is not light enough to enable the road and the persons using it to be seen clearly, at such a rate of speed that the operator is not able to stop his car in time to avoid a collision.

"These accidents, and there have been many of them and several resulting in death, have invariably happened when the automobile had no acetylene gas lamps lighted. The operator, without them, could not see far enough ahead, at the speed at which he was moving, to stop in time.

"Automobiles have collided from this cause with derricks, platforms, teams going in the same and in opposite directions, have run over foot-passengers and have even run through a board fence and dropped onto a railroad track.

"While there is no provision of law requiring the use of searchlights, and possibly they are not needed in well-lighted city streets, the commission feels that it should call the attention of all automobilists to the matter, since operators seemed to think that if they were upon the right-hand side of the road, and if they had the lighted lamps which the law does require, and if they were not operating at a greater speed than the law permits at that point on the road, no fault could be found with them if they struck, for example, a foot passenger who was in the road and who, they claimed, should have been on the sidewalk.

"In one case a foot passenger was not seen because of an electric light which may have dazzled the operator somewhat. Every operator must realize that when he has no searchlights he cannot see far beyond a bright electric light and that he runs quickly into a dark zone. Such conditions have caused two deaths, at least.

"The board feels that operators cannot be exonerated from blame under such circumstances, and that, whether they have searchlights or not, all persons are bound to operate at a speed which is reasonable and proper under the conditions which exist. And a speed is never reasonable and proper if, under any conditions, the operator cannot stop his car when he sees an object on the road before he strikes it. If necessary he must stop his car and cease to operate when he cannot run it so as not to endanger other users of the highway who are exercising reasonable and due care.

"This rule should be applied not only where the streets are imperfectly lighted, or where one is dazzled by an electric light, whether a street light or that of a street car, but around corners and curves, or where one's view is obstructed by other vehicles in passing, or when one cannot see clearly because of a fog or mist.

"The board feels compelled to make this announcement at this time because of the many recent accidents and fatalities in which both pedestrians and occupants of automobiles have been involved.

"It desires, therefore, to give notice to all automobil-

ists that it will take summary action in all cases coming before the commission when it develops that the foregoing requirements for safe and proper operating have not been complied with.

"The commission believes that such a proceeding is absolutely necessary for the safety of the public."

POWER WASTE.

What It Amounts To In the Engine and Where It Goes.

It may never have occurred to many of our readers that the greater part of the heat energy developed in a gasoline engine is wasted and not exerted as power at all. In the average engine only about one-fifth of it is actually turned into power and the other four-fifths are wasted. Even at this rate it just about doubles that which is actually converted into power in the steam engines. Consequently it will be seen how extremely wasteful our present power developing machinery is. Only about ten per cent. of all the heat generated in the steam engine is actually used for power and about twenty per cent. of that in the gas or gasoline engine, while the other ninety and eighty per cent. go to waste.

If all the heat could be utilized for power and not a particle wasted, then a little five horsepower gasoline engine would develop 25 horsepower with exactly the same quantity of fuel that it now takes to put forth 5 horsepower. Five times as much work would be done at exactly the same cost for fuel. But under our present knowledge of converting heat into power there is no way of increasing the proportion of heat saved or decreasing that wasted. Now, why it is necessary to waste eighty per cent. in the gasoline engine and where does it go? If you stand near an engine that is running under a full load you can feel the heat radiate from it at quite a little distance away from it.

This shows you that a large portion of the heat is lost through the cylinder walls and cooling water by means of radiation.

If the hand is held to the open mouth of the exhaust pipe it will be noticed that the exhaust carries away with it large quantities of heat. Radiation through the water jacket and cylinder walls and by the exhaust are the two great avenues of escape through which the heat is wasted. The temperature within the cylinder at the time of explosion is very high. It is an intense heat and since we have only the time of one piston stroke in which to convert it into power, much of this heat remains unused at the end of the stroke and must be gotten rid of in some way before a fresh charge of fuel can be put into the cylinder and ignited, and a portion of it converted into power to keep up the speed of the engine under its load.

If the heat from the previous charge were not exhausted or radiated and thereby reduced to a degree below the igniting point, it would fire the fresh incoming charge the instant that it entered the cylinder, before the receiving valve had a chance to close, and the result would be a back fire or an exhaust report at the mouth of the receiving pipe. The entire amount of heat generated by this charge would practically be wasted by coming out through the receiving valve. This would produce a case of pre-ignition or self-ignition caused by holding within the cylinder too much of the heat of previous charges, or what is sometimes called ineffective cooling of the cylinder. It is the aim of builders to so construct their engines with cooling jackets that the heat remaining after the power stroke is completed is exhausted and

cooled down to a degree considerably below the flash or ignition point for the fresh charge.

The charge must enter a cylinder cool enough so that it will not be ignited by the combined heat remaining in the cylinder from previous charges and that created by the compression of the fresh charge. We must be able to keep the fresh charge from ignition until the proper time for its ignition has arrived, at which time the electric spark is made and fires it at the proper time to get the greatest benefit from the heat resulting from its combustion. Under present knowledge the best we can do is to harness up and actually convert into power only about from twenty to twenty-five per cent. of the heat energy in the gas engine. The balance from seventy-five to eighty per cent., is necessarily wasted.

Improved Tires.

It is always a hazardous undertaking to endorse a new mechanical process or discovery until it has been thoroughly tested, and yet to omit publishing the stated facts of new devices or products might be an injustice to the reading public. So the only right thing to do is to print the most reliable reports and await the test of time to settle the question of truth and superiority.

In this connection the claims made by F. E. McEven, manager of the tire department of the New Jersey Car Spring and Rubber Co., are in order. Mr. McEven is one of the oldest tire men in the United States. Nearly a year ago, he discovered a new process of vulcanization, by which tires can now be manufactured which are not radically different from the tire in general use to-day, with the exception of the fact, that they are thoroughly vulcanized together by the new process, bringing the rubber, fabric, and even the leather into a homogeneous mass, impossible of separation at any time and without injury to any of the fabrics or rubber.

A set of these tires recently made a trip from New York to Chicago, up through Canada and over the mountains upon W. G. McAdoo's Stearns car. The tires arrived at Chicago in absolutely perfect condition. They were not pumped up after leaving New York and at last accounts were on their way to Denver, Col., for a more severe test.

Get Good Tires and Use Them Well.

Buy the best tires; they are the cheapest in the long run. Poor tires are dear at any price. Equip your car with the same size tires all around, and in case of more wear in the rear than in front, a transfer is often convenient.

Removable rims with inflated tires are convenient, as the quickness and ease of making a change on the road appeals to everyone. Many a pleasant ride has been spoiled by a long tire delay.

Regarding the care of tires there are many "don'ts" to be heeded. Probably their greatest enemy is the same as the enemy of man—lack of fresh air. Tires need air and plenty of it. The tire is one of the last things about a car to receive attention. A tire not properly inflated is shuffling the fabric to such an extent that it soon blows out. If a gauge were put on all the cars in use at least 75 per cent. would be found to have their tires insufficiently inflated.

Users should fill in the small cuts in tires and not allow water, etc., to get into the fabric. When chains are used they should be applied correctly. In stopping the car the wheels should not be locked. When starting the clutch should be let in easily. When these simple precautions are observed the user will be surprised at the extra mileage his tires will give him.

Growth of the Business.

In his admirable address opening the Grand Central Palace automobile show, Alderman McGowan of New York City gave the following statistics which are of interest as showing the magnitude and growth of the business. Quite likely some of the figures may not be absolutely correct, as, for instance, the estimate so often made of 200,000 cars being the probable output of the year 1910, 125,000 being a better estimate, but the main statements are approximately right:

Ten years ago the road record was 26 miles an hour, while to-day the average in a long road race is 77 miles an hour.

Ten years ago automobiles were barred from using Central Park, while now they far outnumber all other conveyances on the park roads.

A decade ago only twenty-seven makers of automobiles were in existence, while to-day there are 263 manufacturers, of which 150 are turning out cars of quality. At that time there were not more than 2,500 cars in the country, while now there are 200,000 cars, with 200,000 more cars as the promised production for 1910.

The estimated value of these cars next year is \$225,000,000, as against a little more than \$1,000,000 in 1900.

Such a thing as exporting an automobile in 1900 was unheard of, yet this year our exports will amount to \$8,000,000 for 2,426 cars.

Nevertheless the foreigners are keeping up with the march, as evidenced by the excellent cars they show here to-night, and it is the competition between the foreigners and the Americans that is making the perfect automobile of to-day and making it at a price within the reach of thousands of our citizens.

Automobiles are now made in twenty-one different States in this country, and if the total production reaches the expected mark of 200,000 cars, as against 82,000 cars made during 1909, it will mean that America next year will produce 70 per cent. of all the automobiles made in the world.

One of the important things in connection with this show is the fact that it displays a big line of what are known as the moderate priced cars, what we are pleased to term the car for everybody. The lowest priced car in this show sells at \$378, which is getting down very close to figures that every one can reach. From that we have cars on view running up to \$10,000, giving a variety that should suit the most exacting.

Plows by Automobile.

Recorder Frederick L. Heller of Caldwell, N. J., has successfully used the automobile in plowing his 80-acre farm in Hanover township. When the plowing is completed, the harrow is substituted. Better and faster work is done with the automobile than with a team of horses, while the expense is much less.

To Fasten Number Plates.

One of the best materials to use to fasten the number plate to the axle or frame is a piece of raw hide belt lacing. This will outlast wire or ordinary straps.

It is estimated that 1,500,000 spring vehicles were manufactured in the United States from October 1, 1908, to October 1, 1909.

The automobile industry will probably consume from 350,000 to 450,000 hides this coming year.

There are 88,000 automobiles in New York City.

NEW ENGLAND IN THE AUTOMOBILE INDUSTRY

New England holds her prestige in the production of automobiles and their accessories, just as she does in the case of all the great manufacturing industries.

Can this be questioned when we recall such cars as the Stevens-Duryea, the Locomobile, the Pope, the Corbin, the Knox, the Atlas? Or the Columbia, the Stanley, the Cameron, the Grout, the Metz, the Berkshire, and many others, for no attempt has been made to catalogue them.

And well may she do so. It was in New England that manufacturing had its birth in this country; there it has been fostered and nourished, until it has had a reflex action, giving prominence to that section wherever manufactured goods are used or known.

During the early period of this manufacturing supremacy it reared and trained a body of skilled mechanics than which there were none superior, and this industrial expertness has been inherited by their sons and their sons' sons, until their ability is now freely acknowledged and taken into account by capitalists and investors.

But New England has been conservative in making her superiority known as an industrial center. She has been conspicuously so in her opposition to anything that savored of imitation and of pretense. Possibly she has been positively derelict in her appreciation of the value of advertising, keeping rather too close for this age of publicity to the scriptural phrase, "By their fruits ye shall know them." When the elder James Gordon Bennett was asked to give the secret of the success of the New York Herald, he said in his broad Scotch accent, "It is giving the people the best paper I possibly can and making a damn fuss about it." Now the New England manufactured product has always been of the best, but she has never made such a blanked fuss about it as she might.

But this Boston and New England automobile show will help to do this. It will in a measure indicate not only the extent of her automobile manufacturing industry, but what is of far more importance in these days of mediocrity, it will reveal its quality. The following is a list of the exhibitors at this show, and the closer their product is examined by experts and those interested, the better will the exhibitors be satisfied. It is the 8th consecutive one under the management of Chester I. Campbell, Secretary of the Boston Automobile Dealers' Association, and like those which have preceded it, is the best of evidence of his energy and ability.

American Automobile Co., 563 Boylston St., Boston	Bi-Motor Equipment Co., 27 Haverhill St., Boston.....D 353
A 26-27-28-29-30-33-34-35-36-37	British Napier Motors, 47 Union Ave., Jamaica Plain, Mass
Austin Automobile Co., 182 Columbus Ave., Boston.....A 43	D 318
Abbott-Detroit Boston Co. of N. E., 188 Columbus Ave., Boston	Burn Boston Battery Co., 7 Doane St., Boston.....E 428
44A	Bowser & Co., S. F., 141 Milk St., Boston.....E 432-448
"Automobile Topics" New York City, N. Y.....A 45	Boyd, F. Shirley, 893 Boylston St., Boston.....E 446
"Automobile," 231 West 39th St., N. Y.....A 49	Brunner Mfg. Co., Utica, N. Y.F 550AA
"Auto Trade Journal," Market & 49th Sts., Phila.....A 52	Baldwin Chain & Mfg. Wks., 196 Chandler St., Worcester F 555
Atlas Motor Car Co., Springfield, Mass.....B 150	Bicycling World, 154 Mason St., New York.....F 563A
Atlas Rubber Co., 751 Boylston St., Boston.....C 245	Boston Tire & Rubber Co., 184 Friend St., Boston.....F 564A
American Storage Battery Co., 8 Congress St., Boston..D 300A	Bosch Magneto Co., 223 West 46th St., New York.....F 568
Ajax Trunk & Sample Case Co., 91 Mercer St., N. Y....D 302	Burroughs Remountable Rim Co., 114 Liberty St., N. Y. F 569A
Autocar Co., The, Ardmore, Pa.....D 311-312-313	Baldwin Tumbler Carrier Co., 134 Federal St., Boston G 600AA
American Simplex Co., 261 Dartmouth St., Boston...E 426-427	Batavia Rubber Co., Batavia, N. Y.G 608A
Austin & Doten, 102 North St., Boston.....E 429B	Corlew-Coughlin Motor Co., 21 Hawkins St., Boston
Adams & Co., J. Q., 120 Boylston St., Boston.....G 656	B 105-340-347
American Ever-Ready Co., 114 Bedford St., Boston....F 526	Castle, H. C. & C. D., 893 Boylston St., Boston...B 131-132
Auto Improvement Co., 316 Hudson St., N. Y.F 527	Curtis-Hawkins Co., The, 218 Eliot St., Boston.B 143-144-145-148
Ajax-Grieb Rubber Co., 15 Park Square, Boston...F 549-550	Clapp, Harvey A., Harvard Garage, Cambridge, Mass.B 147-149
Atwater-Kent Mfg. Works, 46 North 6th St., Phila.....F 554	Crane, L. N. Co., 91 Oliver St., Boston.....C 221
American Motor Co., Brockton, Mass.G 600-601-602-603	Chandler & Farquhar Co., 34-38 Federal St., Boston..C 225-226
Auburn Auto Pump Co., Auburn, N. Y.G 608B	Coates Clipper Mfg. Co., Worcester, Mass.....C 227
Aetna Life Insurance Co., 4 Liberty Sq., Boston.....G 612	Columbus Buggy Co., 84 State St., Boston.....C 234
Arseno Electric Co., 39 Cortlandt St., N. Y.....G 613AA	Clayton Air Compressor Works, 42 Battery March St., Boston...D 303AA
Aurora Automatic Mach. Co., 1307 Michigan Ave., Chicago....G 617-618	Columbia Tire & Top Co., 31 Irvington St., Boston.....D 326
Bowman Co., The J. W., 911 Boylston St., Boston.....A 3-7	Champion Ignition Co., Flint, Mich.D 344
Bailey & Co., Inc., S. R., Amesbury, Mass.....A 39	Culver-Stearns Mfg. Co., 34 Southbridge St., Worcester.....D 350AA
Buick Motor Co., Motor Mart, Park Sq., Boston	Connecticut Oil Co., Waterbury, Conn.D 354
B 137-138-139-140-141	Craig Company, David, 68 Broad St., Boston.....D 365
Butler Motor Car Co., 12 Harcourt St., Boston..C 200 to 208 inc.	Colton Combination Tool Co., Chester, Vt.E 414A
Boston Motor Co., 17 Ipswich St., Boston.....C 223	Continental Caoutchouc Co., 1788 Broadway, N. Y.....E 416
Baker, Roy C., 208 Summer St., Boston.....C 229	Coos Wrench Co., Worcester, Mass.E 419
Buxton Machine Co., W. A., 40 Central St., Worcester, Mass...C 249	Columbia Lubricant Co., of N. Y., 116 Broad St., N. Y...E 440
Berkshire Auto Car Co., Pittsfield, Mass.....D 314	Coward, John D., Motor Mart, Park Sq., Boston.....E 442
Brush Runabout Co., Detroit, Mich.D 321	Connecticut Tel. & Elec. Co., Meriden, Conn.....F 501
Boston Electric Auto Garage, 321 Columbus Ave., BostonD 341-342-343-346	Chase & Co., L. C., 89 Franklin St., Boston.....F 508-509
	Consolidated Rubber Tire Co., 11 Hawkins St., Boston F 528-529

- Cramp & Sons Ship & Engine Bldg. Co., Wm., Phila., Pa... F 539
- Crouch Motor Co., Stoneham, Mass. F 565
- Consolidated Mfg. Co., Toledo, Ohio..... F 577-578
- Cleveland Speed Indicator Co., Cleveland, Ohio..... G 619
- Couch & Seiley Co., 10 Thatcher St., Boston..... G 624
- Dodge Motor Vehicle Co., 25 Irvington St., Boston..... A 11
- Dunham Co., Geo. J., 182 Columbus Ave., Boston..... A 44
- Dike, Francis, 2 Brimmer St., Boston..... C 327
- Daniels, Smalley, Motor Mart, Boston, Mass..... F 569B
- Duren & Kendall, 30 Summer St., Boston..... C 335
- Downing, C. J., 1777 Broadway, N. Y..... E 408-409
- Diamond Rubber Co., The, Akron, Ohio..... E 420
- Dover Stamping & Mfg. Co., 385 Putnam Ave., Cambridge, Mass. E 449
- Dixon Crucible Co., Jos., John Hancock Bldg., Boston F 514-515
- Easton Machine Co., 24 Milk St., Boston..... B 146
- Eastman, W. E., 26 Rutherford Ave., Charleston..... C 244
- Eldridge, W. G., 178 Devonshire St., Boston..... C 230
- E. M. F. Boston Co., 28 Summer St., Boston..... C 233
- Eaton, Charles A., 64 Pembroke St., Boston..... D 325
- Empire Tire Co., Trenton, N. J. E 430
- Eco Mfg. Co., 53 State St., Boston..... E 443
- Elec. Storage Battery Co., 80 State St., Boston..... F 510
- Eagle Oil & Supply Co., 104 Broad St., Boston..... F 556A
- Emblem Mfg. Co., The, Angola, N. Y. F 563B
- Excelsior Supply Co., Chicago, Ill. F 567
- Eisner & Co., Harry, 29 Scotia St., Boston..... F 570B
- Fuller, Alvan T., Motor Mart, Park Sq., Boston..... A 1-2 C 247-248
- Fiat Automobile Co., 885 Boylston St., Boston..... B 114-115
- Ford Motor Co., 149 Columbus Ave., Boston..... B 118-119
- Franklin Automobile Co., 671 Boylston St., Boston..... B 128-129
- Fiat Repairs Co., 199 Berkeley St., Boston..... D 309
- Ford Company, Percy, 226 Columbus Ave., Boston..... E 400 to 407 inclusive
- Fisk Rubber Co., The, Chicopee Falls, Mass..... E 436
- Federal Rubber Co., 102 Portland St., Boston..... F 500
- Firestone Tire & Rubber Co., Akron, Ohio..... F 506-507
- Fox Metallic Tire Belt Co., 17 McKibben St., Brooklyn, N. Y. F 530
- Flentje, Ernst, 1643 Cambridge St., Cambridge, Mass. F 532AA
- Forbes, W. J., 70 Long Whf., Boston..... G 620
- General Vehicle Co., 84 State St., Boston..... C 236-237-238
- Gray & Davis, Amesbury, Mass. E 433
- Gramm Motor Car Co., 222 Eliot St., Boston..... C 231-232
- Gabriel Horn Mfg. Co., Cleveland, Ohio..... E 444-445
- Groat Auto Company, 218 Eliot St., Boston..... D 360-361-362
- Goodyear Tire & Rubber Co., 669 Boylston St., Boston F 534-535
- Goodrich Co., The B. F., 851 Boylston St., Boston... F 540-541
- G. & J. Tire Co., Indianapolis, Ind. F 557-556
- Gilbert Mfg. Co., New Haven, Conn..... F 558
- Gasoline Motor Efficiency Co., Jersey City, N. J..... F 571
- Henshaw, C. S., 288 Columbus Ave., Boston..... A 24-25
- Horseless Age, 9 Murray St., New York..... A 47
- Hol-Tan Co., The, 66 Hereford St., Boston..... B 113
- Henderson-Lowe Co., 75 Massachusetts Ave., Boston. B 154-155
- Hudson-Colby Co., 121 Massachusetts Ave., Boston. D 349-350
- H. I. K. Company, 116 Bedford St., Boston..... C 220A
- Hub Auto Renting Co., 366A Columbus Ave., Boston. D 363-364
- Harvey Co., Arthur C., 374 Congress St., Boston..... C 224
- Harriman Engine Co., 53 State St., Boston..... D 304-305-306-307
- Hydraulic Oil Storage Co., 25 Broad St., New York City. D 336
- Hilton Mfg. Co., 15 State St., Boston..... D 343
- Howard Detachable Rim Co., Trenton, N. J..... D 359
- Hillman Auto Supply Mfg. Co., 98 Mass. Ave., Boston... E 412
- Hopewell Bros., Newton, Mass. F 509A
- Herz & Co., 295 Lafayette St., New York..... F 513
- Hoffecker Co., The, 222 Eliot St., Boston..... F 516-517
- Harris Oil Co., A. W., Providence, R. I..... F 519-520
- Heinze Elec. Co., Lowell, Mass. F 536
- Hartford Rubber Works Co., Hartford, Conn..... F 537-538
- Hartford Suspension Co., 150 Bay St., Jersey City, N. J. F 542
- Havoline Oil Co., 749 Boylston St., Boston..... 559
- Hendee Mfg. Co., Springfield, Mass..... 572-573-574
- Holt & Beebe, 40 Sudbury St., Boston..... D 357AA
- Isotta Import Co., 24 Cambria St., Boston..... G 652
- Jenkins & Co., W. M., 286 Columbus Ave., Boston..... A 21-22
- Jeffrey & Co., Thos. B., 90 Mass. Ave., Boston..... B 106-107
- Jones Speedometer, The, 76th St. at B'way, New York... F 502
- Jordan, R. W., 8 Belvidere St., Boston..... D 314AA
- Jacobs, Volney J., 887 Boylston St., Boston..... D 333-334
- Keystone Lubricating Co., Philadelphia, Pa. D 332
- Kemble, A. M., Greenwich, Conn. E 451AA
- Kissell Kar Kompany, 741 Boylston St., Boston..... A 1A-2A
- Kempshall Tire Co., Agt. Hotel Westminster, Boston... F 570A
- Kilgore Mfg. Co., 585 Boylston St., Boston..... G 604
- Knapp-Greenwood Co., 1000 Boylston St., Boston..... G 615
- Kellom & Co., -Chas. F., 113 Arch St., Boston..... G 623
- Locomotive Co. of America, The, 589 Boylston St., Boston B 111-112
- Linscott Motor Co., 163 Columbus Ave., Boston... B 120-212 121-130
- Lunt-Moss Co., 43 So. Market St., Boston..... D 320
- Lyon Non-Skid Co., 435 No. Broad St., Phila..... D 358AA
- Lavolette Co., 112 West 42d St., New York..... E 413
- Lovell-McConnell Mfg. Co., Newark, N. J..... E 415A
- Leland & Co., W. H., Worcester, Mass..... E 417
- Leather Tire Goods Co., Niagara Falls, N. Y..... F 544
- Maguire Co., J. W., 743 Boylston St., Boston..... A 14-18
- Motor Print, Philadelphia, Pa. A 38
- Motor, 2 Duane St., New York A 46
- Motor Age, 1200 Michigan Ave., Chicago A 50
- Motor World, New York City A 51
- Matheson Auto Co., 823 Boylston St., Boston..... B 103-104
- MacAlman, J. H., 889 Boylston St., Boston... B 124-125-126-127
- McCue Co., The, Hartford, Conn. B 152-153
- Motor Specialties Co., 8 Motor Mart, Boston..... D 301
- Murray Co., P. A., Newton, Mass..... D 308-324
- Moore Smith Co., 250 Devonshire St., Boston..... G 651
- Morgan Co., R. L., Worcester, Mass..... D 322
- Martin Carriage Wks., The, York, Pa..... D 328
- Motor Vehicle Pub. Co., 24 Murray St., New York... D 329AA
- Metcalf Mach. Wks., Geo. A., Woonsocket, R. I..... D 355B
- Michelin Tire Co., Milltown, N. J..... E 418
- Morgan & Wright, Detroit, Mich. E 438
- Moore-Smith Co., 250 Devonshire St., G 651
- Mezgar, Inc. C. A., 76th & B'way, New York..... F 504
- Miller, Chas. E., 97 Reade St., New York..... F 566
- Miami Cycle & Mfg. Co., The, Middleton, Ohio..... F 579
- Merkel Light Motor Co., Pottstown, Pa. F 581-582
- Nichols & Co., D. P., 5 Edgewood St., Roxbury. C 209 to 213 incl.
- Neale, A. F., 10 Motor Mart, Park Sq., Boston..... D 331
- National Carbon Co., Cleveland, Ohio E 439
- N. Y. & N. J. Lubricant Co., 165 B'way, New York.... F 503
- Nightingale Whistle Mfg. Co., 1777 B'way, N. Y.... G 614-625
- N. E. Auto Journal, Times Bldg., Pawtucket, R. I..... A 48
- Noonan Tool & Mach. Co., A. S., Rome, N. Y..... D 355A
- Olds-Oakland Co., Mass. Ave., Boston..... B 100
- Oulton Motor & Mfg. Co., 311 Atlantic Ave., Boston... C 246
- Oakley Steel Foundry, Millbury, Mass. E 429A
- Peerless Motor Car Co. of N. E., 178 Columbus Ave., Boston A 12-16
- Park Sq. Auto Station, 43 Columbus Ave., Boston.... A 13-17 C 235
- Premier Motor Car Co., of N. E., 1008 Boylston St., Boston A 42
- Proctor Supply Co., G. H., 28 Irvington St., Boston... B 100 C 243
- Parker & Co., F. R., 243 Columbus Ave., Boston. B 160A, C 351
- Pope Mfg. Co., Hartford, Conn. C 215
- Parker Motor Co., Hartford, Conn. D 352
- Polson, W. F., Buffalo, N. Y..... E 410-411
- Pennsylvania Rubber Co. of N. Y., Jeannette, Pa..... E 423
- Post & Lester Co., 288 Devonshire St., Boston..... E 424
- Pittsfield Spark Coil Co., Dalton, Mass..... E 431
- Pantasote Co., The, 11 Broadway, N. Y..... F 523-524
- Pittsburg Auto Equipment Co., Baum & Beatty Sts., Pittsburg, Pa. F 564B
- Pierce Cycle Co., The, 6 Hanover St., Buffalo, N. Y. F 575-576
- Perfection Wrench Co., Port Chester, N. Y. G 616
- Russell & Co., W. L., 169 Huntington Ave., Boston..... A 20
- Regal Motor Co., 12 Park Sq., Boston..... B 151
- Rainier Co., The, 587 Boylston St., Boston..... B 156
- Reliance Motor Car Co., Owosso, Mich..... C 250-251.
- Rogers, Leo N., 264 Warwick St., Roxbury, Mass..... D 367
- Rausch & Lang Carriage Co., Cleveland, O..... D 330
- Ray, E. A. (Potter Drug & Chem. Co.), Malden, Mass. D 551AA
- Russell & Co., T. F., 113 Summer St., Boston..... E 427AA
- Reliance Speedometer Co., 134 Eliot St., Boston..... E 426AA
- Randall-Faichney Co., The, 251 Causeway St., Boston... F 512
- Robinson & Son Co., Wm. C., 44 Commercial St., Boston. F 525
- Republic Rubber Co., Youngstown, O. F 545
- Reny Electric Co., Anderson, Ind. F 547-548
- Reliance Motorcycle Co., Owego, N. Y..... F 580
- Reading Standard Co., Reading, Pa. G 605-606-607
- Rutherford Rubber Co., Rutherford, N. J. G 622
- Suburban Concrete Block Co., Highland Ave., Somerville, Mass. D 368
- Sawyer Oil Co., Howard B., 65 Long Whf., Boston..... D 366
- Simmons, Hatch & Whitten Co., 73 Essex St., Boston... G 650
- Scars, E. H., 141 Milk St., Boston..... G 654
- Smith, Fred S., 38 Columbus Ave., Boston..... A 15
- Stanley Motor Carriage Co., Newton, Mass..... A 19

Stevens-Sowers Motor Car Co., 821 Boylston St., Boston..	A 23
Studebaker Bros. Co. of N. Y., 1020 Boylston St., Boston	C 214-239-240
Sanders, N. S. H., 173 Huntington Ave., Boston.....	B 133
Selden Motor Car Co., 801 Boylston St., Boston.....	B 135
S. M. Supplies Co., The, 22-24 Lincoln St., Boston..	B 136-142
Star Auto Locks, 53 State St., Boston.....	C 220B
Schacht Mfg. Co., 2727 Spring Grove Ave., Cincinnati, O..	C 222
South End Motor Car Co., 24 E. Concord St., Boston..	D 315-316
Sampson Mfg. Co., Alden, Pittsfield, Mass.....	D 319-323
Standard Motor Car Co., 224 Pleasant St., Boston....	D 339-348
Sterling Hardware Co., 10 Warren St., N. Y.....	D 358
Stackpole Battery Co., St. Marys, Pa.	E 414AA
Smith Co., Wm. J., 424 State St., New Haven, Conn....	E 414B
Standard Welding Co., The, Cleveland, O.....	E 421
Splittorf, C. F., 261 Walton Ave., New York City.....	E 422
Standard Thermometer Co., 65 Shirley St., Roxbury, Mass	E 428B
Stover-Lang Co., 75 Pearl St., Boston.....	E 441
Salman Co., John A., 21 Bromfield St., Boston.....	E 447
Shawmut Tire Co., 103 Bedford St., Boston.....	E 450-451
Standard Tire & Rubber Co., 102 Portland St., Boston..	E 500A
Seamless Rubber Co., The, 534 Congress Ave., New Haven, Conn.	F 532
Swinehart Tire & Rubber Co., Akron, Ohio.....	F 543
Stromberg Motor Devices Co., 1253 Michigan Ave., Chicago, Ill.	F 551-552-553
Sage Trunk Co., 144 High St., Boston.....	G 609AA
Sireno Co., 39 Cortlandt St., New York.....	G 610-611
Tyler, Frank J., 121 Mass. Ave., Boston.....	B 116-117-134
Thomas New York to Paris Car, E. R. Thomas Motor Co., 587 Boylston St., Boston	G 655
Underhill Co., The, 222 Columbus Ave., Boston.....	A 6-10
U. S. Light & Heating Co., 84 State St., Boston.....	F 546
Underhay Oil Co., 73 Batterymarch St., Boston.....	G 621
Victor Metals Co., Braintree, Mass.	D 329
Veeder Mfg. Co., The, 25 Sargent St., Hartford, Conn..	E 437
Victor Auto Supply Mfg. Co., 42 West 43d St., N. Y....	F 511
Vacuum Oil Co., Rochester, N. Y.....	F 521-522
Valentine & Co., 74 Pearl St., Boston.....	F 533
Voorhees Rubber Co., Jersey City, N. J.....	G 613
Winton Motor Carriage Co., The, 148 Berkeley St., Boston	A 4-8
White Co., The, 320 Newbury St., Boston....	A 5-9, C 216-217
Whitten-Gilmore Co., The, 907 Boylston St., Boston	B 108-109-110
White Ware & Co., 1024 Boylston St., Boston.....	D 317
Westinghouse Electric Mfg. Co., Pittsburg, Pa.....	D 356-357
Warner Gear Co., Muncie, Ind.	E 415
White & Bagley Co., 100 Foster St., Worcester, Mass....	E 425
Warner Instrument Co., 925 Boylston St., Boston.....	E 435
Whitney Mfg. Co., The, Hartford, Conn.....	F 518
Wilkinson & Co., A. J., 184 Washington St., Boston..	F 560-561
Y. M. C. A. Auto School, Boston, Mass.....	G 653

Things That Destroy Tires.

Unsatisfactory tire service is almost invariably due to either improper attachment, inadequate inflation, the use of wrong sizes, careless driving or hard driving. Any one

of the five causes will be potent to spoil the work of the best tiremaker in the business, and a combination of two or three would be fatal.

First, it is important to get a good tire; cheapness is often the worst extravagance. Second, it is vital to select one that is strong enough to do the work. A tire of ample size provides the reserve force that will minimize the effects of any sudden strain, and while saving the tire, protect the machine from the bad effects of jarring.

The tire should be big enough to sustain the load. Many tire makers furnish tables which tell just how much weight can justly be put on the various sizes of tires. Particularly is this true of the rear wheels, since it is their function to support three-quarters of the total weight. It is better to have a tire twice stronger and bigger than is needed, than to have one that is 5 per cent. short of the adequate enduring power.

Careless driving is the cause of the blowouts, rim cutting and excessive tread wear. These can be almost entirely avoided by the proper care. The failure to take certain precautions in caring for the tire is the cause of rotting of the fiber and chemical changes that bring in their train punctures and deterioration.

If the brakes could be taken off automobiles, the life of all tires would be extended, possibly one-half. The habit of some drivers of throwing on the brakes hard at the slightest possible excuse is the main cause of tire wear. Only in emergencies, when human life or the saving of the car from wreck may compel lightning stopping, should the brakes be thrown on.

The sliding of the wheels which occurs before the momentum of the car is overcome is certain death to the tire, and the real crime of this waste of tire life is the fact that a large part of the hand braking could be avoided if drivers knew their business. Controlling the speed of the car by the use of the throttle and spark, and bringing it to a stop by closing the throttle, disengaging the clutch and allowing the car to coast till it comes to a halt, would mean a big yearly saving of tire cost. Other drivers have the pretty habit of letting the tires strike the curb. This rapidly wears out the shoe, loosens the thread and allows dirt and water to work in and rot the fabric.

Among the many crimes which can be laid to the door of overspeeding, is the severity on the tires. The friction created by a terrific pace heats the rim. Overloading or improper inflation is the cause of rim cutting. No amount of inflation will prevent the flattening of a tire that is bearing too heavy a load. This breaks down the tire at its weakest point where the flange engages the clutch.

THE SHALER ELECTRIC VULCANIZER will be found illustrated and described in a full page announcement in this issue. Cut out the coupon attached to the advertisement, and forward with your address, and a copy of their Garage Hand Book will be sent you free of charge.

GARDNER AIR PUMP.—Write to the Gardner-Rix G Company, Quincy, Ill., for full particulars concerning the Gardner Air Pump which is made with air or water cooled cylinders. Said to be self-oiling, reliable and efficient.

SPARK PLUG HALF PRICE OFFER EXTENDED 30 DAYS.—The Champion Company of Boston, Mass., in our January issue made a special half-price offer to our readers, by which, if they would cut out a coupon and send in with remittance, they were entitled to buy any of the standard spark plugs manufactured by this company, at half the regular prices. To give all of our readers an opportunity to take advantage of this most attractive offer, the Champion

Company has decided to extend this opportunity for 30 days more, after which it is probable that these plugs can only be purchased at the regular prices. Read the advertisement carefully on another page of this issue and before you forget it, if you want to try these spark plugs, cut out the coupon, fill it out, and your order will be promptly filled, at the low prices, if accompanied by the proper remittance. In writing, address the Champion Company, 37 Whittier St., Boston, Mass.

TRUFFAULT-HARTFORD SHOCK ABSORBERS.—We call special attention to the attractive announcement on our front cover, describing the famous Truffault-Hartford shock absorbers. Every dealer, and for that matter, every automobilist, should get posted regarding the merits of this excellent article. These shock absorbers are used as standard equipment by over 20 automobile manufacturers. They prevent broken springs and make an automobile ride easier and last longer. The manufac-

turers offer to send to our readers, free of charge, their illustrated monthly magazine "Auto Comforts" which is invaluable to every car owner or dealer. Also an illustrated booklet and other interesting matter. These are sent free, and postpaid, if you drop a postal card to the Hartford Suspension Company, 180 Bay Street, Jersey City, N. J., not forgetting to mention this magazine.

VANGUARD SPARK PLUGS.—In this issue the Vanguard Mfg. Company, Department "G," Joliet, Ill., have a new announcement of the Vanguard Spark Plugs. This plug, they say, was originated by two of the foremost ignition experts of the country and is constructed only of first-class material. It can be cleaned, the manufacturers say, "in a jiffy." But consult their advertisement and write to them for further particulars.

Subscribe to the "Automobile Dealer and Repairer," \$1.00 Per Year.

AN EXCELLENT RUBBER TIRE VULCANIZER.

The accompanying cut is an illustration of the new No. 7 1910 Model Adjustable Sectional Vulcanizer manufactured by the Auto Tire Vulcanizing Company, Lowell, Mass. This vulcanizer as will be seen has three cavities. It has a capacity from a 2-inch motorcycle tire to 4½-in. automobile tires. It has 12 pairs of bead irons, thus insuring a perfect fit for all the various makes of tires, either Clincher, Dunlop or Goodyear style, or Fisk mechanically fastened, also the Clincher type of motorcycle tire. This vulcanizer is furnished with gas or gasoline burner or to connect direct to steam boiler. The vulcanizer is cast in one piece and is steam jacketed. This machine is a valuable adjunct to any tire repair

shop. It is a money maker and a money saver. We also invite attention to some other tire specialties advertised on another page by the Auto Tire Vulcanizing Company, Lowell, Mass. For further particulars communicate with the company and mention this publication.

strength. The center parts of the stocks are handsomely mottled. The tap wrenches are adjustable, taking all the taps in the assortments, and have tool steel jaws, drop forged centers nicely mottled, and knurled handles. These screw plates are meeting with much favor among automobile repair men, and seem to be exactly suited to this difficult class of work.

"HORSEY NO-CEMENT INNER TUBE PATCH."—The Motor Supply Agency Company, 1246 Euclid Avenue, Cleveland, Ohio, have an announcement in this issue of their "Horsey No-Cement Inner Tube Patch." This patch is made of the best Para rubber and does not require cement or acid. It is not affected by the heat of the tire and contains no acid to injure the tube.



New No. 7, 1910 Vulcanizer. Manufactured by the Auto Tire Vulcanizing Co., Lowell, Mass.

REPAIRING AUTOMOBILE SCREWS.—There are no parts of a modern motor car that seem more insignificant and are really of more importance than the screws. They undergo severe strains, and it is natural that they should sometimes need to be repaired or replaced. As making these repairs is primarily a matter of having proper tools with which to work, it is interesting to note the screw plate assortments being made for the automobile trade by the Wells Brothers Company of Greenfield, Mass. There are two of these thread cutting assortments, or screw plates, each of which contains taps, dies with collets, a stock, and a tap wrench. The taps and dies are made to cover a suitable range of sizes, and they conform exactly to the A. L. A. M. standard in sizes and number of threads to the inch. These assortments are so made up that one is a continuation of the other. The repair shop which has both assortments is therefore prepared to tap out holes and to cut threads on screws of all sizes according to the adopted A. L. A. M. standard. The taps made by the Wells Brothers Company are well known for their uniform fine quality and staying power, and the dies are the "Little Giant" adjustable style. The stocks in these screw plates are made with steel tubing knurled handles, to gain lightness without loss of

By the use of gasoline, punctures can be repaired in less than five minutes. Further particulars can be obtained by writing to the company as above for their descriptive circular.

REAR END TIRE HOLDERS.—The Garage Equipment Mfg. Company, 402 Florida Street, Milwaukee, Wis., have a full-page announcement in this issue showing some of their live specialties, among the number being their "Rear End Tire Holders." A holder of this sort has long been needed, and will undoubtedly be appreciated by nearly every owner of an automobile. But consult their announcement, not only for their tire holder, but also for their holder for detachable rims and spare tires. In writing to them for their complete catalogue, which will be sent free of charge to any one asking for it, kindly mention this paper.

THE IMPROVED FLEXIBLE VALVE REMOVER.—The Flexible Valve Remover Co. of 12 Beverly St., Providence, R. I., have purchased full rights of the patented Flexible Valve Remover formerly owned by the S. B. White Co. The Flexible valve remover is one of the best known tools for this kind of work on the market. It is used in this way: After the valve nut is removed from the engine cylinder, the hook portion of the tool is set so that it bears against the upper surface of the valve. The forked end of the lever handle is then inserted under the valve spring retaining washer, and one of the chain links inserted into the slot in the middle in such a position that the grip of the handle is higher than the yoke end. Pressure on

the handle raises the spring and the valve pin can then be removed easily and quickly. The flexibility of this tool due to the use of the chain, makes it most convenient for work around pipes and fittings. This tool has undergone very radical improvements in the hands of its new owners. Many details of construction have been changed which have rendered the tool more serviceable than ever. But the crowning achievement of the new manufacturers is that they have made two tools of what was formerly only one. The handle of the valve remover has now been fashioned into a tire tool of great usefulness in removing all kinds of tires. In its new form, the flexible remover makes a very necessary addition to the outfit of every automobilist and garage man. It is anticipated that the new Flexible Valve Remover Company will do a very large business the coming season with these goods.

VALUABLE OIL BOOK AND SAMPLE FREE.—Every reader of this publication who will send for it, mentioning this medium, will receive free of charge a sample of splendid automobile oil and a valuable book on the subject of lubrication, by addressing Geo. A. Haws, 67 Pine St., N. Y. City, and we hope that hundreds will avail themselves of this exceptional opportunity. Kindly remember that it is essential that you mention THE AUTOMOBILE DEALER AND REPAIRER.

"MOTOROPE"—Every automobilist will appreciate the importance of a good rope for towing, binding rear wheel to prevent skidding, and securing trunks, packages, etc. "Motorope" is manufactured by B. M. Asch, 1779 Broadway, New York City, and is said to be made of the finest quality of selected Manilla hemp. Mr. Asch says that his rope is as strong as ordinary rope three times the size. It is fitted with galvanized hook for quick and easy attachment. There are two sizes, \$1.00 and \$2.00. No. 1, 30 feet long and ½ inch in diameter. No. 2, 40 inches long, and ¾ inch in diameter. See advertisement on another page and in writing mention THE AUTOMOBILE DEALER AND REPAIRER.

LENGTHEN THE LIFE OF YOUR TIRES.—Triple-Tread Auto Mfg. Company, 1543 Michigan Avenue, Chicago, Ill., have a half-page announcement in this issue showing how the life of a tire may be lengthened. They claim you can get from 5,000 to 10,000 miles more out of your old tire casings by letting them "triple-tread them." But consult their announcement and send on a set of old tires if you feel like it, and see what they can do for you. They will give you still further particulars of their plan, if you will write to them and mention this paper.

BALL MULTI-SPARK PLUG.—In this issue will be found the announcement of the Ball Multi-Spark Plug Company, 100 2d Avenue, Aberdeen, S. D. The advantages of this plug, as set forth by the manufacturers are "Multiplicity of sparks," "Sparks of higher caloric value," "A plug not easily fouled," "Greater economy in battery," "Consumption and increase of power." The electrodes are so arranged, the manufacturers state, that it is impossible for them to become bridged across with carbon and oil deposit from the use of too much cylinder oil. But write to them for prices and their catalogue giving further details and particulars and mention THE AUTOMOBILE DEALER AND REPAIRER.

EMPIRE TIRE COMPANY of Trenton, N. J., advise us that J. M. Shackelford will hereafter manage their uptown branch at 73d Street and Broadway, New York. He takes the place of their former manager, Marcus Allen.

"ADAMANTINE" THREADING TOOLS.

Special attention is directed to the line of threading tools, taps, dies and screw plates manufactured for the automobile trade by the American Tap & Die Company of Greenfield, Mass. The illustration shows one of their handy screw plate sets adapted to the use of any automobile re-

fit, together with a complete outfit of supplies. Inasmuch as wood alcohol is used to supply the heat, it can be used on the road or anywhere. It furnishes all the advantages of a large steam vulcanizer, and yet is so compact that it can be carried in the tool box. The entire outfit weighs three pounds, and comes packed in a neat wooden

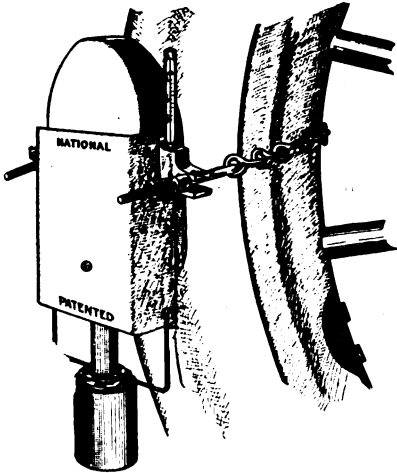


Screw Plate Set. Manufactured by American Tap and Die Co., Greenfield, Mass.

pair shop. These screw plates have been brought up to the highest state of perfection as to utility, lightness, finish, strength, etc. The factory in which they are manufactured is equipped with the latest type of machinery and tools for making thread cutting articles. This company issues an exceedingly attractive illustrated booklet, which must be intensely interesting to every dealer, repair man, or supply dealer in the country. It will be mailed free of charge to anyone who will write to the American Tap & Die Company, Greenfield, Mass., and mention the AUTOMOBILE DEALER AND REPAIRER.

A NEW VULCANIZER.

The price of tires is so high that the question as to how to lengthen their lives has become very prominent. Auto owners



The National Steam Vulcanizer.

are beginning to see the necessity of a vulcanizer with which they can thoroughly repair their own tires at home or on the road. The National Motor Supply Co. of Cleveland, O., are manufacturing a machine which seems to meet every requirement. The National steam vulcanizer is constructed of a brass shell partly filled with water. An alcohol lamp forms this water into steam, thus making it on the same principle as the large steam vulcanizers used in tire factories. The steam eliminates the danger of burning the rubber. A thermometer tells the exact amount of heat at all times. After the right temperature is obtained, which only takes about seven minutes, the flame of the lamp is lowered and an even steady heat is easily maintained. The "National" was designed especially for individual owners and garage use. Full instructions accompany each out-

fit, together with a complete outfit of supplies. Inasmuch as wood alcohol is used to supply the heat, it can be used on the road or anywhere. It furnishes all the advantages of a large steam vulcanizer, and yet is so compact that it can be carried in the tool box. The entire outfit weighs three pounds, and comes packed in a neat wooden

A HANDSOME CALENDAR.

The "Firestone Trio" is the title of a handsome art panel which has been brought out by the Firestone Tire & Rubber Company, of Akron, Ohio. It is 16½ by 34½ inches in size, lithographed in twelve colors, and has a large calendar pad, making it especially suitable for garages, salesroom and office use. We understand that one



of these calendars will be sent to any reader of this paper who will write for it, mentioning the AUTOMOBILE DEALER AND REPAIRER.

NEW "DOVER" GARAGE GASOLINE MEASURE.

The New "Dover" extra heavy galvanized gasoline measure herewith illustrated is an ideal five-gallon gasoline measure both for the garage and automobilists. It has a small bowl on the top which prevents slopping and it can be carried to the automobile, raised up to the running board and the



The "Dover" Garage Gasoline Measure.

tank without spilling and can be easily and quickly poured into the funnel without dripping or spilling. It lists at the popular price of \$2.00 each. This measure is manufactured by the Dover Stamping & Mfg. Company, 385 Putnam Avenue, Cambridge, Mass. This company has an attractive half-page announcement in this month's issue illustrating a number of other devices for the garage and for the individual car owner. Interested readers should write to this company for catalogue and prices, not forgetting to mention this paper.

THE "HANDY" SEVERABLE BATTERY REPAIR PLATE.—Those of our readers who have not already done so, will perhaps serve their own interests by consulting the advertisement in this issue of the Electrical Maintenance and Repair Company, Sunday Call Building, Newark, N. J. They have recently brought out a booklet fully describing this device and what it will accomplish. Send for it and mention this paper.

THE "BAIR" AUTO TOP HOLDER.—Through a printer's error the word "Bair" in the advertisement of the Auto Specialties Mfg. Co., Department "B," 79 Dearborn St., Chicago, Ill., was changed to "Blair" in their advertisement in our last issue. This company wants readers to understand that their top holder is the "BAIR" and not the "Blair" holder. They have so much confidence in this device, that they have offered to refund the money in every case in which the purchaser is dissatisfied with one of their holders. You can see them at almost any dealers and learn from the dealer just how they work, or you can get an illustrated catalogue by writing to the company, as above.

At the annual meeting of The Swinehart Clincher Tire & Rubber Company of Akron, Ohio, it was decided to call a meeting of the stock holders for the purpose of increasing the capital stock of the company. W. W. Wuchter was elected president to succeed J. A. Swinehart. The latter accepted the position of vice-president. C. O. Baughman, secretary, and R. A. May, treasurer. The word "Clincher" was dropped from the name of the company, which will hereafter be known as The Swinehart Tire & Rubber Company.

GRAY'S RUBBER STEERING WHEEL RIM.—This rim gives the chauffeur a perfect grip. No slipping is possible. It has a wood core, and a rubber covering, ¼ inch in thickness. Up to 16 inches the price is \$4, and larger sizes \$5. Send for particu-

lars to the Standard Leather Washer Co., Newark, N. J., not forgetting to mention this publication. Also send for particulars concerning some of their other lines of interest to motorists.

NEW 1910 MODELS OF K-W MAGNETOS.

The K-W Ignition Company, 37 Power Avenue, Cleveland, Ohio, illustrate here-

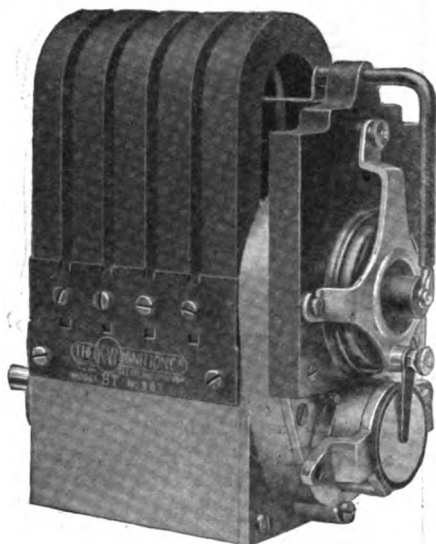


Fig. 1.

with a few of their new models for this year. Fig. 1 shows their model H-T, high tension magnet. This high tension is what is known as the pure high tension type, that is, it is an entire and complete ignition

the distributor via an insulated wire and from thence is distributed to the various cylinders of the motor. Technically, this type of magneto is known as the inductor type. The K-W Ignition Company claims that the largest automobile motor made can be started with ease by a simple quarter turn of the crank direct from this magneto, rendering it unnecessary to have batteries on the car. These magnetos are made for any number of cylinders up to eight, for both four and two cycle engines. The permanent magnets are five in number and are square in cross section, and are made from a special alloy of tungsten steel and are warranted by the company to retain their magnetism forever.

Figure 2 shows one of their models of low tension magnetos which simply act as a source of current, and are intended to operate either ignition or electric lights. When operating on ignition the current from the magneto has to go through the ordinary timer or commutator and the ordinary vibrating coil. It is simply intended as a powerful and reliable source of current to take the place of batteries.

By referring to Fig. 3, which is a sectional view of the low tension magneto, it will be seen that the winding in these magnetos also stands still, and that the rotor which has four wings on it at right angles to each other the same as on the high tension, revolves and collects the magnetism and alternates the magnetic flux through the circular winding, producing four waves of current per revolution of the magneto. These low tension magnetos are made in several models, but on the same principle.

Fig. 4 illustrates a new and unique method of changing over an ordinary acetylene

bulb for magneto, the other bulb for battery. It will further be noted that the speedometer light is in series with the tail light, so that if the speedometer light is burning the tail light must of necessity also be burning. The dotted lines show battery connected to the side and one of the bulbs in the tail lamp. It is claimed that a 60

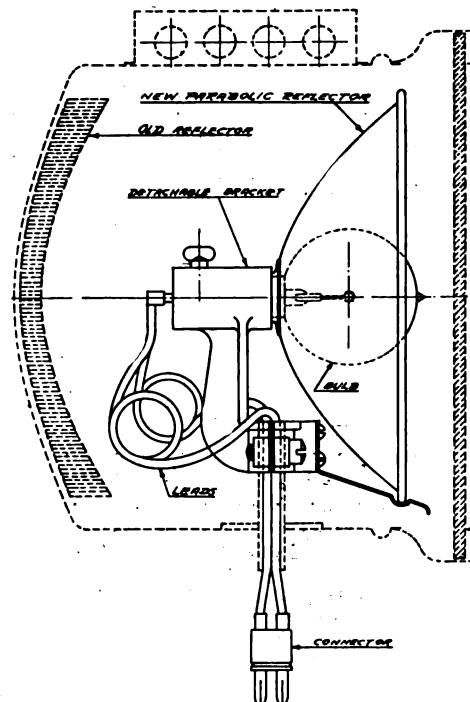


Fig. 4.

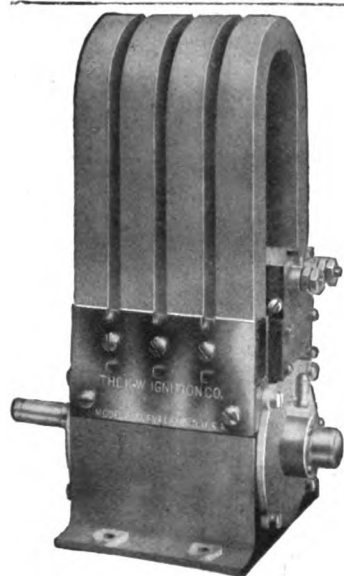


Fig. 2.

system within itself, as no battery, coil, commutator or wiring is necessary, as the secondary cables run direct from the high tension distributor on the magneto to the spark plugs. It only being necessary to run a wire from the binding post on the spider which holds the distributor cap on, to a switch on the dash, and from the switch on the dash to the frame-work of the motor. This switch is used for stopping the engine. Both the high tension and low tension windings stand absolutely still, thus dispensing with the usual commutator and brush. The high tension current comes up from the winding and goes through bus bar either to the safety gap, in case a plug cable is off of the plug, or else to the center of

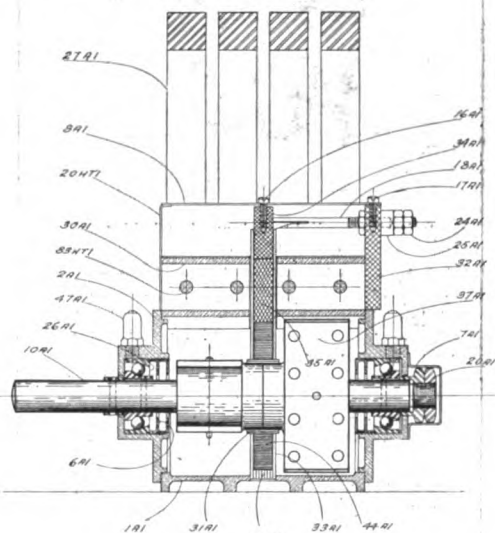


Fig. 3.

gas lamp into an electric lamp. It will be noted by referring to the cut that all that is necessary is to remove the burner from the acetylene lamp and fasten on the bracket by means of a screwdriver and slip the silver-plated parabolic reflector in place. It is claimed that these reflectors when equipped with 3 ampere, 18 candlepower Tungsten bulbs give far more light than the best acetylene burner and the light is very white and steady, making a very pleasant light to drive behind.

Fig. 5 shows wiring diagram showing how a K-W magneto should be wired up on a car to furnish both ignition and electric lights. In case it is desired to run electric lights only, the wire leading to

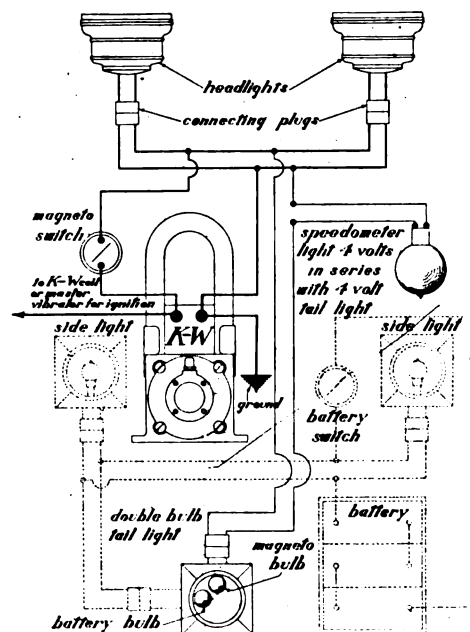


Fig. 5.

or 80 ampere hour battery on one charge will serve for the standing stum lights for a month or six weeks without recharging, as the magneto furnishes all the current necessary for the powerful electric headlights, which takes practically 90 per cent. of the work off the battery, as the battery lamps only draw one-quarter of an ampere each, whereas the headlights draw three

amperes each. In case it is desired to use oil for the standing still lights, such as the side and tail lights, it would, of course, dispense with the battery. The K-W people claim that this makes the simplest and most efficient electric lighting system that it is possible to devise.

THE BARRETT PERFECTION INNER SLEEVE.

This is manufactured by the Lynn Auto Co., 29 Sea Street, Lynn, Mass. The accompanying cut gives a good idea of its appearance, and the manufacturer states



Barrett Perfection Inner Sleeve. Manufactured by the Lynn Auto Co., Lynn, Mass.

that it will hold blow-outs and rim-cuts and will prevent blow-outs in weak places. If you carry this sleeve in your automobile you do not need an inside shoe. The sleeve is made exactly like the inside of the shoe and consists of from 4 to 7 ply of the strongest closely woven vulcanizing fabric. The sleeve is formed to exactly fit the inside of an outer casing with two flaps to go over the rim and can be cemented down, which holds it in place. It also lessens the strain on the shoe and will not wear out.

Prices of this sleeve are quoted in the advertisement which appears elsewhere, for the first time in this issue. Readers who send in their orders should not forget to mention the AUTOMOBILE DEALER AND REPAIRER; or a descriptive circular will be sent free on application.

THE GOODSON FIRE EXTINGUISHER.

The Goodson Electrical & Mfg. Co. are manufacturing a special chemical fire extinguisher for automobiles and garages. These extinguishers sell for \$1.50 each, or \$7.50 a half dozen, and \$12 a dozen, with a special discount to garages. It is a metal



tube 22 inches long and 12 inches wide, filled with a chemical compound that is instant death to all fires, including gasoline, benzine and naphtha, etc. The manufacturers state that these extinguishers cannot freeze, get out of order, deteriorate, or explode. They are good until used. Hundreds of automobile manufacturers and gas engine manufacturers have installed these extinguishers in their plants; a few of them being the Rider-Lewis Motor Car Company, Pittsburgh Motor Vehicle Company and Alden Sampson Mfg. Co. Every automobile owner and garage should be

equipped with a fire extinguisher. No one knows when a fire will strike. The Southern Motor Car factory of Houston, Texas, when they equipped their plant on the 20th day of July last year with Goodson extinguishers, did not expect to have a fire, but they wanted to be prepared. On August 19th, less than a month after they ordered their extinguishers, they wrote the Goodson Electrical & Mfg. Co. as follows:

"We had occasion to use some extinguishers purchased from you and found them most satisfactory."

The Goodson Electrical & Mfg. Co., 150 Point St., Providence, R. I., will be pleased to send a catalogue and estimates. Be sure and read their advertisement on page 515 as it describes other goods which they manufacture and are selling this month at special introductory prices. Be sure and mention this journal.

FOY ELECTRIC REAR LIGHT AND NUMBER HOLDER.

This convenient and attractive device which is illustrated herewith, is proving very popular among discriminating car owners. The rear light is a German Tungsten electric bulb imported exclusively for this purpose. The lens used is a standard railroad signal type, ruby red in color, and visible for one mile. The license number is



The "Foy" rear light and number holder. Upper view shows holder open to facilitate cleaning.

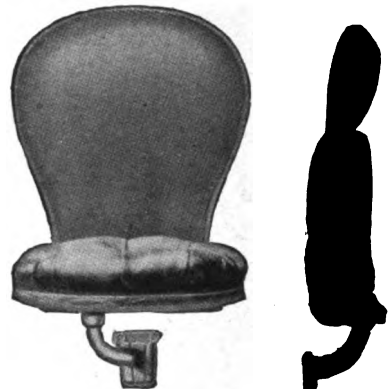
brightly illuminated and the danger signal is a complete one. A ground glass runs the full length of the under part of the lamp. This makes a well-diffused white light, which completely illuminates the number and projects a beam or bar of white light to the roadway which is, in addition, a preventive of rear collisions.

This device is offered to our readers at the low price of \$6.50 in brass or \$7.50 in nickel finish. Extra Tungsten bulbs are sold for 50 cents each. Interested readers should write at once to the Jordan Equipment Co., Beverly, Mass. An attractive illustrated circular will be mailed free on application. In ordering, customers should state whether they intend the use of lamps in connection with ignition battery, or with separate set of dry cells. When not otherwise specified a six volt lamp will be supplied. In your correspondence please mention the AUTOMOBILE DEALER AND REPAIRER.

"LUXURY" AUXILIARY SEATS.

These are manufactured for automobiles, pleasure boats, carriages, etc., by Graves & Congdon Company, Amesbury, Mass. We illustrate one of their particularly popular styles of seat, which is designated style "A." The seat is shown open and folded, and it will be seen that when folded it occupies a very small space. Each seat is attached by a dovetailed socket secured

in the side of the car into which it can be inserted in a moment, and can be detached with equal facility. No tools are necessary to place or remove the seat. Every owner of an automobile should know about these particular seats, and not confound them with others of an inferior make. "Luxury" auxiliary seats are guaranteed to be in all respects as represented, and they are very



Open.
The "Luxury" Auxiliary Seat. Style A.
Closed.

reasonable in price. Dealers, repair men and garage owners should write for illustrated circular and prices to Graves & Congdon, Amesbury, Mass., not forgetting to mention this journal.

NEW DOVER AUTOMATIC GASOLINE GARAGE FUNNEL.

The Dover Stamping & Mfg. Company of Cambridge, Mass., are putting on the market a new gasoline funnel of a new and convenient shape, which, while it was especially designed for garage use, is very practical for the automobile owner's use. It is furnished complete with chamois and the bowl is exceptionally large, drawn in one piece, having a large inside hoop with chamois held firmly to the bottom. This hoop rests on two cross wires inside the bottom to prevent chamois strainer from sagging.

Outside it has a handle for convenience, and a large hoop on the base, which rests on the auto tank when in use and gives the funnel great stability, entirely doing away with the slopping from tilting so com-



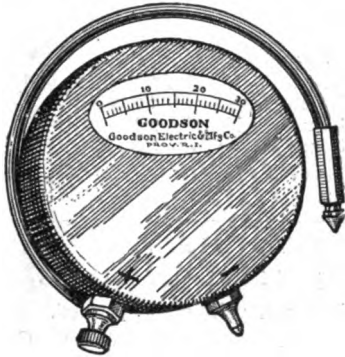
Dover Gasoline Garage Funnel.

mon in the flaring type of funnel. It also has their new perfected ball shut-off, which automatically cuts off the outflow of gasoline when the top level is reached. In this way the surplus poured into the funnel may be poured back into the fuel can and saved. This is accomplished in a very interesting way without complication. While the same is made both copper plated and galvanized, the makers especially recommend the galvanized ones, because they keep cleaner and will never rust.

STOP!

Mr. Automobile Owner

Don't pass this page. You can't equal these prices. Will take your verdict on the goods, but just to make assurance doubly sure, we guarantee them for one year, and more, will return your money if they don't make good.



\$2.50 Ammeters cut to **\$1.30**, Postpaid.
\$2.75 Volt Meters cut to **\$1.50**, Postpaid.
\$3.00 Combination Volt Ammeter cut to **\$1.65**, Postpaid.

GOODSON AUTO

FIRE Extinguisher



Instant death to all fires, including burning gasoline, naphtha, grease, paints and oils. Good until used, cannot freeze, explode, cake, deteriorate, or get out of order.

See News Item on page 514

You need Goodson Fire Extinguishers in your car. Over five thousand cars destroyed by fire every year.

SEND IN YOUR ORDER TO-DAY **\$1.50 Each**



GOODSON JUMP SPARK PLUG

A mechanical masterpiece of simplicity and efficiency, giving results at all times and on all types of engines.

It is simple in construction, easy to repair or replace porcelain, thoroughly mechanical, and has proven to be the most satisfactory plug ever produced.

REGULAR PRICE, \$1.00.

Special Price **40c**, Postpaid.

STOP!

Mr. Dealer and Garage Man

You can buy the following specialties direct from our factory at net prices. Order Now and we will promise prompt shipment.

WRITE FOR OUR SPECIAL PROPOSITION ON OUR FIRE EXTINGUISHER

GOODSON HEAVY COPPER TERMINALS

The copper market shows strong indications of a material advance in the near future. We expect to be compelled to advance our prices 25% within next sixty days. Order now in as large lots as you can swing. Prompt delivery.



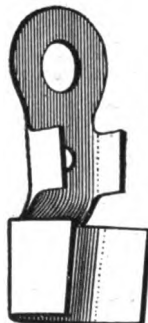
No. 0
40c. per 100



No. 1
60c. per 100



No. 2
80c. per 100



No. 3
\$1.10 per 100

GOODSON TIRE POWDER



Goodson Tire Powder cannot be surpassed.

Cans have double sifter top. Size of cans, 2 in. by 7 1/2 in.

50c.
Per dozen



GOODSON BATTERY CONNECTOR \$1.15 per 100



THE GOODSON Case of Battery Connectors and Copper Terminals

Finished Wooden Case with slide cover. Contains 100 Battery Connectors, 400 Copper Terminals — 100 each, 4 kinds.

\$4.00

SEND IN YOUR ORDER NOW—TO-DAY—MONEYBACK ON ANY GOODS UNSATISFACTORY
GOODSON ELECTRIC & MANUFACTURING CO., 150 Point St., PROVIDENCE, R. I.

Please mention the Automobile Dealer and Repairer when writing to advertisers.

TIRES AND TUBES

I secured a very large lot of tires at a great reduction in price, paying spot cash for them. I offer the following tires for cash only. Send 10% of the amount of your order to cover transportation charges, and I will ship subject to examination. Get your order in as soon as you can before the Spring rush. My 1909 business was 3 times greater than 1908. I expect to double my 1909 business, because I am getting orders now from my old customers stating, "Send me tires like the last ones," from Kentucky, Alabama, Texas, Oregon, Canada. There is a reason. Vanderpool's a good place to buy tires. On account of the low price tires are sold, makers buffed off their names.

Size	Case	Tube	Size	Case	Tube	Size	Case	Tube
28x3	\$10.50	\$3.00	30x4	\$17.50	\$5.00	33x4	\$20.00	\$5.75
30x3	11.50	3.25	31x4	18.00	5.25	34x3½	16.50	4.50
28x3½	12.50	3.75	32x3½	15.50	4.00	34x4	21.00	6.00
30x3½	15.00	3.75	32x4	19.00	5.50	34x4½	23.00	6.50

The above Cases and Tubes fit any Clincher or Universal Rim.

The following cases and prices are for the 1905 and the Universal type Dunlap Rims.

Size	Case	Size	Case	SINGLE TUBE TIRES.					
28x3	\$12.00	30x4	\$23.50	26x2½	\$9.00	28x2½	\$10.00	28x3	\$12.00
30x3	13.00	32x4	25.50						
30x3½	18.50	34x4	27.50						
32x3½	19.00			In ordering state how many lugs are wanted.					

In ordering state how many lugs are wanted.

My tires are all new, fresh 1909 and 1910 stock direct from the factories. The largest Tire Dealer in the West. Order and you will do so again. Many others have.

WM. VANDERPOOL, 110 W. Main Street, Jamestown, Ohio.

SCREW PLATES AND MACHINE RELIEVED TAPS.

The Wiley & Russell Manufacturing Company of Greenfield, Mass., are manu-

specialty of this firm and sizes No. 0 to No. 14 are carried regularly in stock. You will make no mistake in giving tools made by a concern of the reputation of the Wiley

Our readers who prefer a pipe to a cigar would do well to investigate the merits of the Freeman pipe, manufactured by the Freeman Pipe Company, Petoskey, Mich. It is described by the manufacturers as "the only sanitary smoking pipe not a freak." The device for disposing of the nicotine and keeping it out of the mouth has worked very satisfactorily in a sample pipe which the writer has tested. A descriptive circular concerning this pipe will be forwarded to any reader sufficiently interested to write for it.

ELECTRICAL INSTRUMENTS. — Readers should carefully peruse the attractive full-page announcement which appears in this issue from the Hoyt Electrical Instrument Works, Penacook, N. H. This company manufactures a very complete line of voltmeters and ammeters and other current measuring instruments. These meters are standard in quality and are recognized as such throughout the world. The Hoyt instruments should be particularly interesting to our readers, and the manufacturers invite correspondence. Please be sure to



Green River Sets of Stocks and Dies.

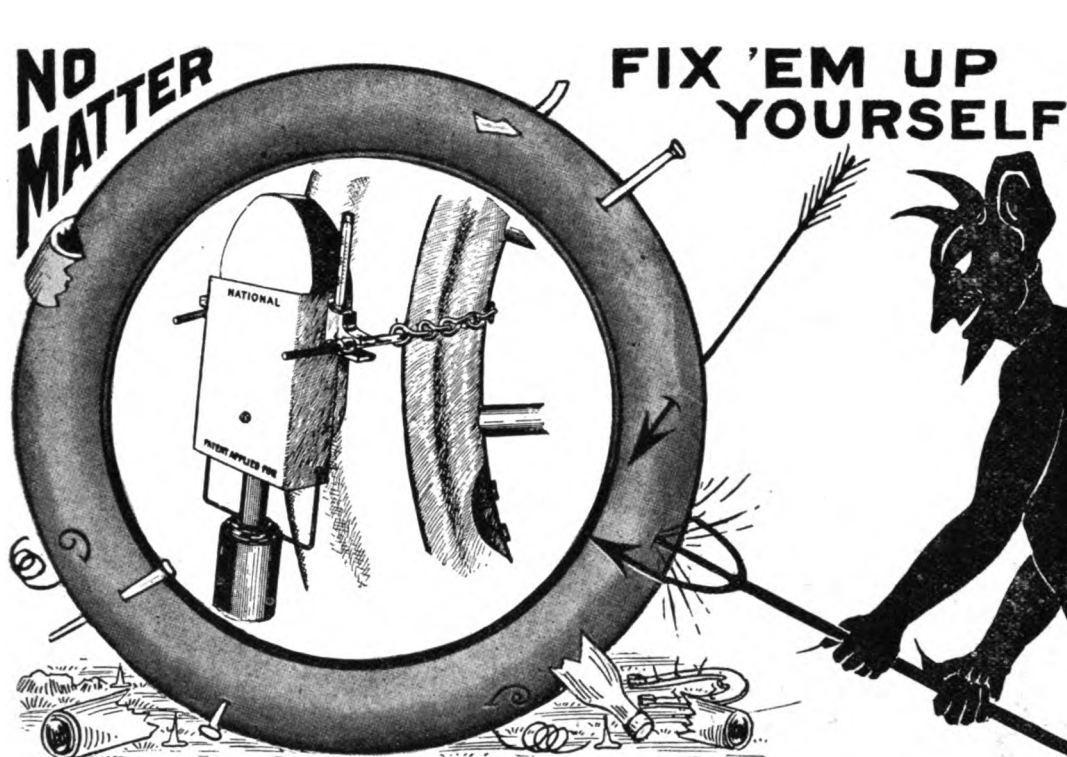
facturing screw plates and machine relieved taps especially adapted to the requirements of the automobile trade. The Green River sets of stocks and dies, as illustrated, are furnished with the A. L. A. M. standard threads and are carried regularly in stock for immediate shipments. The dies as furnished with these sets are the Green River round adjustable dies, split in two parts. Adjustable dies of this kind are mechanically correct, as the taper screws act as a gauge so that when adjusting, the two halves will always come central with the guide, thus distributing the work equally on the four cutting edges. Also, the dies being in two separate parts can be ground when dull, thus greatly prolonging their life. Accuracy is another demand of the automobile trade, and the manufacturers of the Green River sets guarantee their product to be absolutely true and accurate in angle, pitch and diameter. They also manufacture the celebrated Lightning Machine Relieved Taps, which are now being used by many of the largest manufacturers of automobiles in their factories. Taper pin reamers with spiral flutes are also a



Lightning Taps.

& Russel Mfg. Co. a trial, and their guarantee of efficiency and accuracy is well worth considering. read the announcement and in corresponding with these people do not fail to mention this periodical.

Please mention the Automobile Dealer and Repairer when writing to advertisers.



TEST
IT
FREE

NATIONAL STEAM VULCANIZERS WON'T BURN YOUR TIRES!

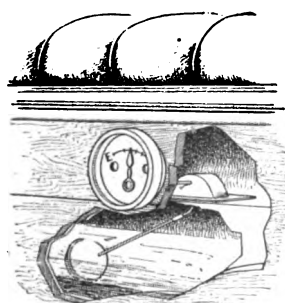
Repairs Both Tubes and Casings, and Can be Used on the Road if Desired.

You do not need any electricity to operate the "NATIONAL." Generates its own STEAM with an alcohol lamp, which can be controlled perfectly. The BEST VULCANIZER MADE for GARAGES and INDIVIDUAL OWNERS. Works fast and cheaply. It is exceptionally easy to operate, and you cannot fail to do good work. Full instructions and complete supplies go with each Vulcanizer.

SPECIAL OFFER: To any responsible firm or individual, we will ship an outfit by express, prepaid, on ten days' free trial. You can then see for yourself that the "National" is superior to any vulcanizer on the market. Hundreds are in daily use all over the world. Pays for itself before you know it. Circular "G" tells more about it.

COMPLETE OUTFIT BY EXPRESS, PREPAID, \$8.50

AGENTS WANTED EVERYWHERE.



"E-Z-2-C" GAUGE, \$2.50

WE MANUFACTURE THE MOST COMPLETE LINE OF GASOLINE GAUGES ON EARTH.

Our gauges have no cogs, magnets, springs or anything else to get out of order or "stick." They are "perfectly simple, and simply perfect." Leading Auto Manufacturers equip with our gauges. Insist that the car you sell or buy is equipped with a "National" Gauge. The manufacturers will furnish it, without extra charge.



"NATIONAL" GAUGE, \$1.50

THE NATIONAL MOTOR SUPPLY COMPANY,

CLEVELAND, OHIO.

Please mention the Automobile Dealer and Repairer when writing to advertisers.

EVERY Is Subjected

Built to do its work well—

So we assure ourselves in advance that no defective Brictson Detachable Tread shall go onto a customer's tire.

This we do—by submitting each Tread to a test so severe that it would tear into shreds the best rubber tire ever made.

To fulfill to the utmost their mission—each Brictson Detachable Tread must prove itself to be many, many times stronger than the best molded tire.

Each and every Brictson Detachable Tread—before going to our shipping department must receive a “bill of health”—after it has successfully withstood a test of 80,000 lbs.

Then—if ever—the Tread will show its flaw. No road test—none of those conditions under which you motor day after day would impose a test one-tenth as severe as this one.

Brictson Treads are constructed to successfully withstand every condition which works for deterioration and for final ruination of your rubber tires.

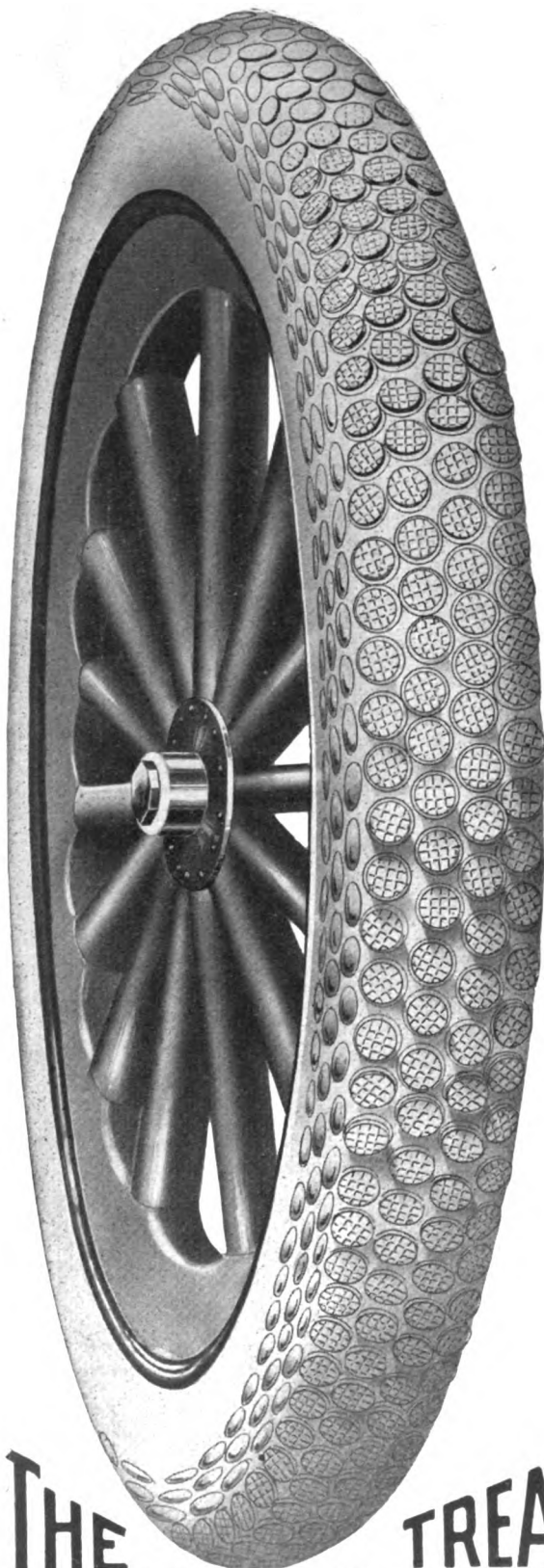
Otherwise their record wouldn't be as it is—outwearing always from three to six new rubber tires and frequently more.

Otherwise—the Brictson Detachable Tread wouldn't be the barrier between the tire and those causes of punctures and blowouts.

Otherwise—the Brictson Detachable Tread wouldn't insure for you—as it has for thousands of enthusiastic motorists, not only less expensive motoring but also motoring with a minimum of danger and the maximum of pleasure.

Now, then—we have pictured herewith a very practical test which you as a motorist or any dealer is at liberty to apply to to the Brictson Detachable Tread.

Take a Brictson Tread—secure the regulation building jack. Then get together three husky men. Place the jack inside of the Tread with a wooden block under and above it.



THE TREAD

BRICTSON MANUFACTURING CO.,
Box A. D. 02, Brookings, South Dakota.

Send all information, prices, propositions and booklet about Brictson Detachable Treads.

Name.....

Address.....

Size of Tires.....

← FOLLOW THE ARROW SEND COUPON

Please mention the Automobile Dealer and Repairer when writing to advertisers.

BRICTSON TREAD

to a Test of 40 Tons

Screw the jack up just as tight as these three men can turn it. You will be surprised to find at the close of this test that nowhere either in the chrome leather exterior or in the canvas and leather interior lining—has it shown the slightest tendency to part.

Before your own eyes, this test will convince you if you are inclined to doubt—that a Tread that can stand up under such a strain—will surely make good on your tires.

Their daily record on tires everywhere—proving to those who only half believed before trying—is the reason at the bottom for the success of these, the genuine tire protectors.

Each user finds the Brictson Detachable Tread to do just as we claim.

Saving the tire—reducing tire repair bills—making motoring safer and far more pleasant.

Satisfying this man and that—the good word passes to his friend or neighbor. He buys. And so—the real story underlying the success of “Brictson Tread Popularity” is an endless chain of satisfied patrons.

No further urging—no extended argument, Friend—ought to be necessary to induce you to try-out at least one pair of Brictson Treads.

So certain will the pair prove their utility worth in reducing tire expense—that if you'll permit just a word of friendly advice—it would be this:

Order a Complete Set—this very day—securing the greatest good by equipping all four tires.

At least please fill out the attached coupon—now.

This brings our Proposition and our Booklet—“The Enemy of Tire Expense.”

The booklet gives the evidence of others—the proposition makes it worth very much your while to equip your tires with Brictson Detachable Treads.

So just send the coupon to-day—you cannot invest a moment or two to greater profit.

Address like this—

THE BRICTSON MANUFACTURING COMPANY,

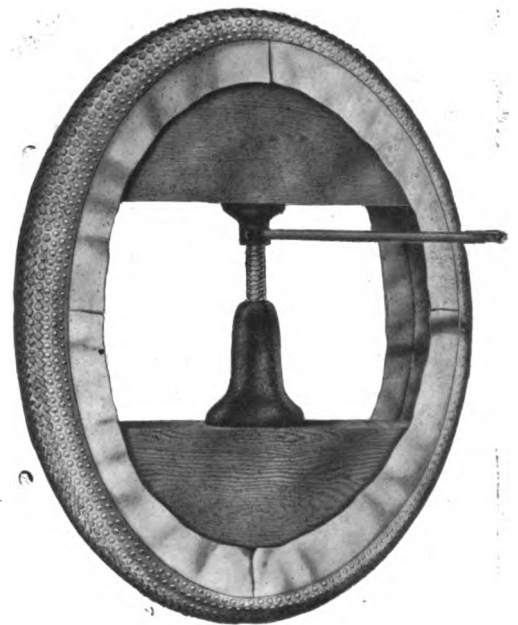
Box A. D. 02,

BROOKINGS, S. DAKOTA, U. S. A.

WIDE-AWAKE DEALERS

Will appreciate the value of our Selling Plan to the Trade. How it puts dollars in their pockets and without the element of risk. Ask for Brictson Dealers' Opportunity—to-day. The extent of your earnings is only limited by the degree of promptness with which you act.

SURE TODAY



APPLY THIS TEST TO ANY BRICTSON DETACHABLE TREAD

Three men ahold of the bar—two blocks of wood under and above the jack and then screw up to the last fraction of a turn. This test is only limited by the strength of the three men—not by the strength of the Brictson Detachable Tread.

Please mention the Automobile Dealer and Repairer when writing to advertisers.

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Semi-Annual Manufacturers' Clearing Sale of

TIRES AND TUBES

As the season is far advanced and all the factory orders are completed, the tire manufacturers find on hand a number of sizes they have too many of. They are closing out this surplus stock at prices less than actual cost of manufacture.

We guarantee these strictly new 1909 goods or refund your money, if found unsatisfactory, upon receipt. Orders filled upon receipt of 10 per cent. of order to cover us on transportation charges.

This lot includes Morgan and Wright, Hartford, Continental, Diamond, Goodyear, Ajax, and all the best makes of tires. Will sell the lot, while they last.

CASINGS AND TUBES TO FIT ANY CLINCHER OR UNIVERSAL RIM

SIZE	CASINGS	INNER TUBES	SIZE	CASINGS	INNER TUBES
28x3	\$10.50	\$3.00	34x3½	\$16.00	\$4.25
30x3	12.00	3.50	34x4	20.00	6.00
30x3½	15.00	4.50	34x4½	22.50	7.00
30x4	17.50	5.00	34x5	20.00	6.50
31x4	18.00	5.00	36x3½	12.50	4.25
32x3½	15.00	4.00	36x4½	22.50	7.00
32x4	18.00	5.50	36x5	24.50	7.50
33x4	20.00	6.00			

SINGLE TUBE TIRES

26x2½, \$9.00 28x2½, \$10.00 28x3, \$12.00

SEND FOR COMPLETE LIST

EXCELSIOR TIRE CO., 1775-1779 Broadway, New York City

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DELCO IGNITION.—"Delco" Ignition was designed, the manufacturers say, for the man who wants comfort in motoring. Seven advantages are presented in their full-page announcement in this issue why every owner of an automobile should invest in the "Delco" systems. But consult their announcement. Cut out the coupon and mail to the Dayton Engineering Laboratories Co., Dayton, Ohio, and they will send you one of their 1910 catalogues giving detailed description of their systems.

IF IT'S GRAY'S—IT'S THE BEST!



PERFECT GRIP NO SLIP

Wood Core—½ Rubber vulcanized on. Up to 16" inc., \$4.00. Larger sizes, \$5.00

Standard Leather Washer Co., Newark, N. J.

FIVE YEARS OF SUCCESS



BLOOMFIELD, N. J.

A Better Plug Cannot be Made

BOOKS FOR THE DEALER AND REPAIRER

JUST OFF THE PRESS.

Automobile Troubles and How to Remedy Them.
Automobile Driving Self Taught.
Automobile Motors and Mechanism.
Ignition, Timing and Valve Setting.
A, B, C of the Motorcycle.
Motor Boats: Construction and Operation.
Flexible leather and cloth bindings, round corners, UP-TO-DATE, RELIABLE.
Price \$1.50 and \$1.00 each, postpaid.
Sold by Booksellers, Auto and Marine Supply Houses or direct. THE CHARLES O. THOMPSON CO., Publishers, 347-338 Wabash Ave., CHICAGO.



AUTOMOBILE WHEELS.—We understand that the Sarven Wheel Company of Indianapolis, Ind., which has been established since 1850 has decided to take up the manufacture of automobile wheels. They have installed a complete equipment, consisting of two carloads of the latest improved machinery for making both auto and artillery wheels of all sizes to comply with the specifications of automobile manufacturers. This company has long had an enviable reputation as manufacturers of carriage and wagon wheels, and, of course, is favorably situated for taking up the manufacture of automobile wheels. This factory will have a capacity of several hundred wheels each week. The present managers of the company are W. E. Maxwell and O. R. Clements, who are thoroughly familiar with the requirements of automobile wheels.

"MARVEL" ELECTRIC FORGE BLOWER.—This handy blower for the automobile repair man is illustrated this month in our advertising columns. The manufacturers state that this blower is 70 per cent. heavier than any other machine blower on the market. It is a one fire forge blower and has a variable speed with alternating current and direct current. It is stated that it costs less than three cents a day for electric current to run this blower. The retail price of the blower is \$28.00 and it will be shipped on 30 days' trial anywhere to responsible parties. Write for descriptive circular to the Electric Blower Co., 352 Atlantic Avenue, Boston, Mass., and mention this periodical.

AUTO PARTS AND SUPPLIES.—The Neustadt Auto and Supply Company, 3948 Olive St., St. Louis, Missouri, has an advertisement in this issue directing attention to their auto parts and supplies at special prices. Their catalogue giving full particulars for 1910 is now ready and will be sent free of charge to any reader who will write for it, mentioning this paper.

Please mention the Automobile Dealer and Repairer when writing to advertisers.

WANT ADVERTISEMENTS.

Under this head will be printed advertisements of shops for sale or to rent, or shops wanted, or situations or help wanted, or tools or machines (second-hand) wanted or to exchange, at the uniform price of two cents a word, which will include the address, for each insertion, payable in advance. No advertisement will be inserted for less than 30 cents, however small.

Remittances can be made in postage stamps if more convenient. Address,

MOTOR VEHICLE PUBLISHING CO.,
24 MURRAY STREET, NEW YORK.

COMMERCIAL MOTOR VEHICLES—Read the "Power Wagon" for reliable information concerning motor trucks, motor busses, motor cabs and other machines employed for business purposes. Issued monthly; single copies, 10 cents; \$1 a year. The most valuable paper of its kind published. The Power Wagon, Metropolitan Block, Chicago.

TOPS—Until further notice, runabout tops \$20, touring car tops \$25. C. G. Meyer & Son, Tiffin, Ohio.

"STEAM, Steam, Steam, That's The Stuff"—All Steam Car Owners should subscribe for the "Steam Motor Journal" a 28 page illustrated monthly devoted exclusively to the interests of the steam propelled automobile. \$1.00 per year, sample copy 15 cents. Chas. D. Sherman, 212 Orchard Road, New Haven, Conn.

ATTENTION—AUTOMOBILE BARGAINS, closing out balance of stock at half prices. Write us your wants. Box 276, Burlington, Wis.

STANLEYS—Exceptional bargains, due to many owners ordering the new models. Choice of many cars. Prices are lowest now. Macker-Tyler Co., 31 Central St., Worcester, Mass.

A WINNER. MAGICLEAN WOOD POLISH—Entirely different and far superior to all others. For Auto Bodies, Tops and Upholstery. Made under formula of famous German "Holz Glanz." Cleans like magic, with hard, glassy, glossy, lasting lustre. No acids, no alkali; absolutely harmless. Price \$1.00 quart, \$2.50 gal. Express prepaid. Agents wanted, easy seller, large profits. F. H. Schmoeger, Sterling, Ill.

AUTOMOBILE INSTRUCTION—The West Side Y. M. C. A. Automobile School gives a practical course in shop and road practice in four or eight weeks, day or evening. Provision made for out of town men. 322 West 57th St., N. Y. City.

FOR SALE—Genuine Bargain—Pierce Arrow, \$1,000; Peerless, \$1,200; Renault, \$1,000; Fiat, \$1,000; 1901 Reo, \$600; 1907 Olds Roadster, \$650; 1908 Pope Hartford, \$850; 1906 seven-passenger Packard, \$1,000. Also Premiers, Loziers, Stearns, Buicks, Fords, Camerons, Stevens, Marmon. Also chassis bodies, tops, taxi-cabs, sightseers, trunks. Correspond with me to buy or sell. R. B. Corbett, 524 W. 36th St., New York.

FOR SALE—Four 20-passenger Mack Sight-Seeing cars. Several taxicabs, delivery wagons. R. B. Corbett, 524 W. 36th Street, New York.

FOR SALE—Packard Touring Car, 1904 Model, all in good running order, 34x4-in. tires; rear tires new. Will sell cheap for cash if taken at once, to save storage. Address, C. M. A., Box 126, Voluntown, Conn.

FOR SALE—Auto shop, warehouse, shed, tools and machinery. Four lots. Established business of 24 years. Write Lock Box 13, State Center, Iowa.

FOR SALE—Brush runabout. A1 condition. Demonstration. \$350.00. Address Box 45, Hamburg, N. J.

FOR SALE—Orient buckboard, run 1000 miles. Tires good. Equipped with lamp and horn. Price \$200.00. Address, Earl Hastings, Corinth, Vermont.

FOR SALE OR EXCHANGE—Automobile runabout and moving picture outfit. Wanted, motorcycle, cash, gas engine and dynamo. Address, Hendley, Lock Box 8, Wolcottville, Ind.

FOR SALE—40 h. p. Thomas, fully equipped. A1 condition. \$700. Address, G. T. Phillips, 433 Warren St., Bridgeport, Conn.

WANTED—Second-hand radiator for 1906 Mitchell runabout. State condition and price. Wm. Schade, Cropsey, Ill.

SALES AGENTS

WANTED in the following cities, to handle Se-Ment-Ol, the new Chemical compound for repairing leaking radiators and cracked water jackets. None but those handling first-class lines need apply.

Boston
Washington
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New Orleans
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Kansas City
Denver
Salt Lake City
San Francisco
Seattle

The Northern Chemical Co., Marietta, Ohio.

FOR SALE—New front and rear automob-

bile axles for different weight cars. Also

a few sets of wheels for immediate delivery.

Timken Roller Bearing Axle Co., 429

Wabash Ave., Chicago, Ill.

Just What You Want!

Don't Metal Polish Your

life away, but finish the brass parts of your auto with *Stay Shiny—The Marvelous Tarnish Preventive*, and have them look like gold plate all the time. Saves hard, dirty work, time and money. One invisible coating preserves original high polish and absolutely prevents tarnish on lamps, radiators and trimmings for months, under heat, rain, and all weather conditions. Easily applied, easily removed when desired and non-injurious to metal. Fully guaranteed. Price \$2.00 pint can, with brush. Express prepaid. Lasts a year. Thousands of auto owners are delighted users of this long looked for article. Garages and Agents make big, easy money, selling *Stay Shiny*. If not sold by Dealer, will send can prepaid upon receipt of price. Write me right now.

F. H. SCHMOEGER

Sterling, Ill.

SEND US YOUR BROKEN CYLINDERS,

crank cases, etc., for repair by Oxy-Acetylene Welding. We weld cast iron, aluminum, etc. Ask the people we served (names cheerfully supplied). Try us and be convinced. **WELDING WORKS**, Waterbury, Conn.

FOR SALE

Strong built, two story brick wagon, carriage, paint and horse-shoeing shop, about 50x80 feet on about thirteen city lots, with power and machinery. City and artesian water. Electric light. Store room. Two stories about 35x50 feet on main road. Trolley and Steam cars. Two miles outside of New York City. Useful for automobile shop, garage, wood or silk mill or any manufacturing plant. Easy terms. Wish to retire. Address, A. B., Box 654, New York City.

FOR SALE—Running gear with tires \$50.00. Seat and top \$25.00. Steering gear \$10.00. Pressed steel frame \$12.00. Head lights and generator \$12.00. Two 2-1-2 Diamond inner tubes, new, \$5.00. Send for circular. J. Sealer, Richland, Penna.

MITCHELL 1908 MODEL "I" TOURING car with Splitdorf magneto, Prest-O-Lite tank, Solar lamps, two extra tires and tubes, top and tools. This car cost \$2,300, and is as good as new excepting paint, tires and top. Cash price, \$1,600.

1908 Twin Indian Motorcycle, 5 h. p., as good as new, excepting paint and tires, one extra inner tube. Cash price, \$175.

E. J. Smith & Sons, North English, Iowa.

BETTER CONTROL—The F-B Company, Columbia, S. C., has an announcement in this issue with respect to a device they have for controlling the Buick No. 10 and the 20 Olds car with their Automatic Clutch Releaser. Descriptive circular giving full particulars with prices will be sent on application.

EMPIRE TIRES—We have received from the Empire Tire Company, Trenton, N. J., a handsome booklet containing testimonials in the shape of fac-simile letters from parties who have used their tires, and found them to be satisfactory. One of these booklets will be sent to every reader interested enough to write for it. Mention this journal.

THE GROWTH OF A BIG BUSINESS—It is forty years ago since Dr. Benjamin F. Goodrich, at the close of the Civil War secured control of a small rubber factory near this city. The enterprise was held back for lack of funds. Dr. Goodrich, however, had faith in the product he was manufacturing and decided that the west offered superior facilities in his line. He located at Akron, Ohio, and commenced business in a small brick building of two stories. In 1880 the business was incorporated under the name of the B. F. Goodrich Company with a capital of \$100,000. At that time the output consisted of hose, belting, packing and moulded goods. The development of the business was rapid, new buildings were added every year. When the automobile came on the stage the B. F. Goodrich Company commenced making tires, and have built up an enormous business with this single article. Their plant now covers 20 acres with 23 acres of floor space and employs 5,000 men. From the modest start in 1870 with a few hundred dollars the resources have grown to over ten millions from the earnings of the company alone.

WOODWORTH TREADS—The Leather Tire Goods Company of Niagara Falls, N. Y., have a full-page announcement in this issue, descriptive of Woodworth Treads. They say the great bulk of all delays and annoyances incident to motoring is caused by some form of tire troubles, and their advertisement tells how these tire troubles can be overcome. They would like to tell you a great deal more about the matter, than they can in the advertisement, and will do so, if you will cut out coupon attached to their announcement and send for their 1910 catalogue.

WIND SHIELDS—The Vanguard Manufacturing Company of Joliet, Ill., has evolved an entirely new and original idea in wind shields and have named this new creation the "Vanguard Zig-Zag." In this shield is embodied, they say, all the good features known to the craft with a few original ones added. The Zig-Zag shield can be fitted on any car of any type, and can be adjusted to any position desired. The upper half containing the plate glass works automatically on friction joints and a slight pull with one hand will adjust it to any angle desired. The entire shield is made of first-class material only. The upper frame is made of solid brass tubing beautifully finished. The glass is 3-16 selected plate and is securely held in place with a phosphor bronze spring channel. Write for further particulars and prices, mentioning this publication.

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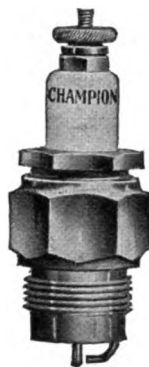
**CHAMPION
Magneto Special**

\$1.50 All Sizes
**\$1.75 with Champion
Terminal**
Heavy bar electrode can-
not burn or warp
Gives Splash Spark so
effective on magneto
Positive setting of points
cannot change under
heat in cylinder



**CHAMPION
Two Point Magneto**

\$1.25 All Sizes
Will overcome absolutely
pre-ignition caused
by overheated
spark plugs
Especially recommended
for use on Pierce-
Arrow, Pope Hart-
ford, Stevens-
Duryea, Peerless, Corbin
and Columbia cars



**CHAMPION
Regular**

\$1.00 All Sizes
The highest quality por-
celain procurable
Center-wire firmly ce-
mented and baked in
No chance for leak
Gasket construction pro-
tects porcelain
perfectly
Nickel points cannot cor-
rode, oxidize or
carbonize



**CHAMPION
Mica**

\$1.00 All Sizes
Same accurate workman-
ship as in all other
Champion plugs
Mica core guaranteed
against short circuit
for one year
Only clear India mica
used



**CHAMPION
X**

75c All Sizes
Best grade porcelain
Core can be dissembled
Gasket construction simi-
lar to that of regu-
lar Champion
Has no equal on the
market for
the price



**CHAMPION
Motor Cycle**

\$1.00
Not a cut-down automo-
bile plug, but designed
expressly for motor
cycle use
2 Meteor points for use
with Magneto or coil
Soot proof chamber
Absolutely tight on com-
pression
Will stand any heat or
weather conditions

HALF PRICE OFFER

We offer these plugs to you at *one-half* above prices, if coupon attached is sent with remittance *within thirty days* Not over one dozen plugs to one person. Send coupon and money *now*. Plugs positively guaranteed. Mark cross opposite thread and type wanted.

Genuine Champion Plugs manufactured only by

THE CHAMPION COMPANY

37 Whittier Street, BOSTON, MASS.

HALF PRICE COUPON.

Please send, postage prepaid, plugs as here speci-
fied at *one-half* regular prices quoted in this ad.
Enclosed find \$..... to cover.

Quantity..... Thread.....Type.....

Name.....

Address.....

A. D. & R. Name of Car.....

REVOLVING CASES

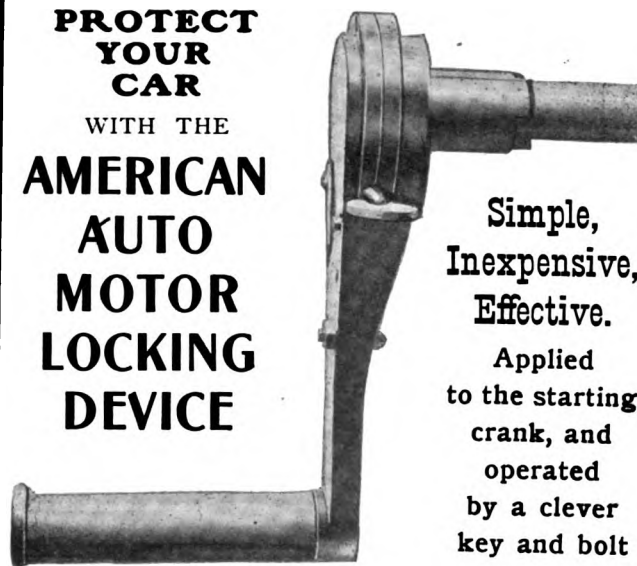


No manufacturer, dealer, or repairer of automobiles should be without our Cases. They occupy but a small space and capacity is very large. Each case guaranteed to give satisfaction. Used for bolts, screws, and small parts. Made in 32 different styles and sizes. Send for catalogue and price list. Manufactured by

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**PROTECT
YOUR
CAR
WITH THE
AMERICAN
AUTO
MOTOR
LOCKING
DEVICE**



Simple,
Inexpensive,
Effective.

Applied
to the starting
crank, and
operated
by a clever
key and bolt
plan.

No Thief Can Steal Your Car.

No one can use your car without your permission.

Good Agents Wanted.

Write for Circular, Prices and Dealer's Proposition.

The American Auto Motor Locking Device Co.,

141-143 Stockholm St., Brooklyn, N. Y.

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Live Specialties



**GUARANTEED
NOT
TO RATTLE.**

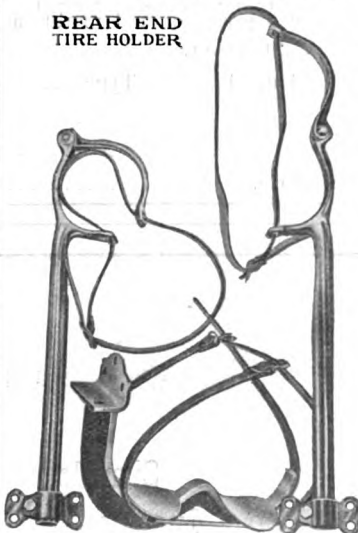
Made of
Brass Tubing.

Our aim is to make the best and not the cheapest wind shield on the market and we are catering to high class trade only.



Rear End Tire Holders.

REAR END
TIRE HOLDER



This set of Tire Holders supplies a long felt want. The large hook which is intended to be fastened to the cross member of the frame of any standard automobile, and especially roadsters, is for the purpose of supporting the weight of the tire.

The two long folding arms are to be fastened to the sides of the body, or underneath the tonneau, by a strong clamping bracket, (no set screws being used) and hold the tires at both sides. Strong leather straps are furnished. Each set packed in a separate box.

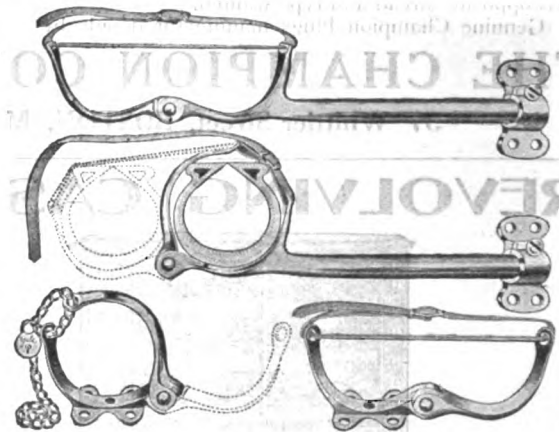
Set No. 1, for 3, 3½ and 4 inch tires,

Set No. 2, for 4½, 5 and 5½ inch tires,

	Brass	Black
Price per set, -	\$7.50	\$5.50

"Milwaukee" Folding Tire Holders.

For Single or Double Tires; also Holders for Demountable Rims and Spare Wheels.



Emergency Mud Hook

For Pneumatic Tires



"THE AUTOMATIC" Spring Bumper

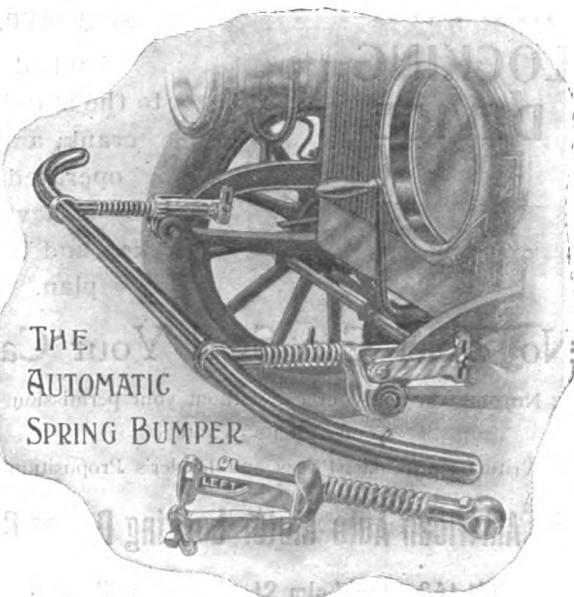
No Holes to Drill
No Bolts to Change

WE HAVE IT AT LAST. The great feature of our Bumper over all others is that it can be put on to any car WITHOUT DRILLING any HOLES or REMOVING the SPRING HANGER BOLT.

Send for our Complete
Catalogue of Live Specialties

The farmer will charge the price of two sets to pull you out of one hole.

THE
AUTOMATIC
SPRING BUMPER



GARAGE EQUIPMENT MFG. CO.

402 Florida St., MILWAUKEE, WIS.

Woodworth

WOODWORTH TREADS

Made of chrome leather—studded with steel rivets.

DO NOT CHAFE OR HEAT THE TIRE.

Woodworth Treads are the only true tire protectors. They never chafe or heat the tires. They are held in place by coil springs along the sides, which automatically take up all slack and prevent any looseness. The protector is always tight and smooth so that it cannot chafe the tire.

No other protector can be fitted in the way that these automatically fit themselves.

They fit all makes of tires—anyone can easily put them on.

Tires are high—it will pay you to save them, especially when you can at the same time prevent punctures and skidding.

Woodworth Tire Chains are made in the regular side-chain style and in single chains, which can be strapped to the spokes. Each cross piece has a strap of heavy chrome leather under it, protecting the tire from wear or injury by the metal.

Send for our 1910 catalog showing the treads, chains and other devices that save tires and prevent skidding.

LEATHER TIRE GOODS CO.

NIAGARA FALLS, N. Y.

Canadian trade supplied from Niagara Falls, Ont.



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YOU MAY LOOK AND LISTEN BUT YOU WILL FIND THAT THE BALL MULTI-SPARK PLUG

Has No Competitors.

Some of Its Merits Are:

MULTIPLICITY OF SPARKS

SPARKS OF HIGHER CALORIC VALUE

A PLUG NOT EASILY FOULED

GREATER ECONOMY IN BATTERY CONSUMPTION

and INCREASE OF POWER

Economical Current Consumption

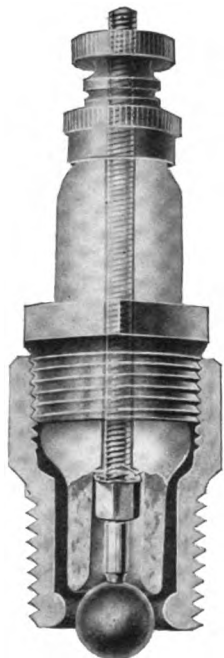
Experiment proves that the larger the spark gap the smaller the current consumption; therefore the Ball Multi-Spark Plug is the most economical, because it employs the largest spark gap.

Fouling of Electrodes

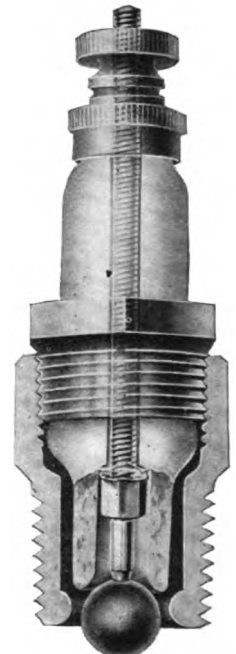
The Electrodes are so arranged that it is impossible for them to become bridged across with carbon and oil deposit from the use of too much cylinder oil, for the scavenging action of the gases passing at high velocity through the annular spark gap has a tendency to eliminate that trouble.

Simplicity-Strength

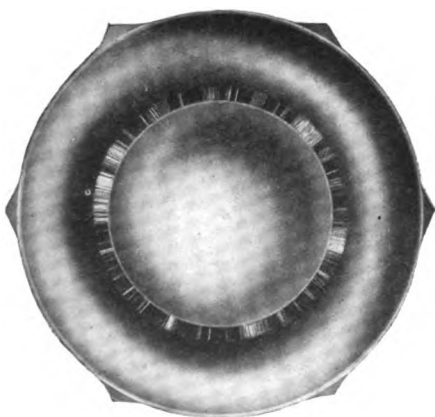
We employ the Best Porcelain obtainable.



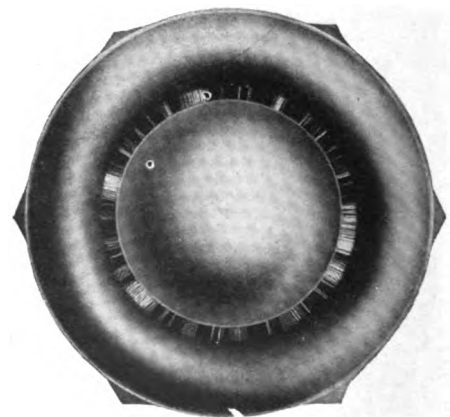
Sectional View of
Spark Plug
Reliable
Economical
Efficient



Sectional View of
Spark Plug
A most reliable and durable
plug that every Motor
Car and Motor Boat owner
should use.



End View of Spark Plug in Operation



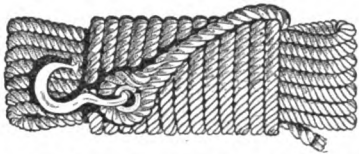
End View of Spark Plug in Operation

SEND FOR PRICES AND CATALOG TO-DAY

THE BALL MULTI-SPARK PLUG CO.

No. 100 2d Avenue, ABERDEEN, So. DAKOTA.

MOTOROPE



Every car should be equipped with a good rope for towing, binding rear wheel to prevent skidding, securing trunks and packages and for other purposes. "Motorope" is made of the very finest quality of specially selected Manila hemp, and is stronger than ordinary rope three times as heavy. It is equipped with galvanized hook for quick and easy attachment. Two sizes, \$1.00 and \$2.00. Address B. M. ASCH, 1779 Broadway, New York City.

THE CLEVELAND TWIST DRILL CO.

SETS OF DRILLS TRADE MARK SETS OF TAPER PIN REAMERS FOR THE GARAGE New York Cleveland Chicago

AUTOMOBILE SPRINGS All Styles.

Made or duplicated by TUTHILL SPRING CO. 578 Polk Street, CHICAGO, ILL.

THE CLIMAX AIR COOLED MOTORS are the best automobile motors out. Guaranteed forever against defective material and workmanship. Let us tell you all about them. Write at once for Catalogue. CLIMAX ELECTRIC WORKS, New Salem, Mass.

BUY YOUR MOTORS IN FEBRUARY



4 1/2 x 4	Opposed Air Cooled,	75
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5 x 4	" " " "	80
4 1/2 x 4	Water " " "	80
4 1/2 x 5	" " " "	85
5 x 4	" " " "	85
5 1/4 x 4 1/2	" " " "	100
5 1/4 x 6	" " " "	130

Get our No. 60 Bargain Sheet of other parts. AUTO PARTS CO., 517 to 523 W. Jackson Boul., Chicago, Ill.

"Knipe" Pat. Ball Bearings. Steel Brass Balls. 1/2 Inch Shaft and Up. No Fitting. Just Push Them On. 10 Cents in Stamps for Sample. PRESSED STEEL MFG. CO., 454 The Bourse, Phila., Pa.



Rotary Pumps.

ALL SIZES. Manufactured by THE LIPMAN MFG. CO., 400 Pleasant St., Beloit, Wis. Send for Catalogue.



TRY IT We mean our superior goods against others "ERICKA" Hand Soap It's a Fine Hand Soap "ERICKA" Auto-Car Soap Shine and Metal Polish At All Dealers

GASOLINE STORAGE UNDERGROUND OUTFITS

\$12.50, \$25.00, \$35.00 and up. GOOD GOODS. LOW PRICES. LUBRICATING OIL TANKS ALSO. \$3.50, \$5.25, \$6.50, \$10.00 and up. Cabinets, \$15.75 to \$100.00. Oily Waste Cans, meeting insurance requirements. Accurate Measures, and good funnels. Kamp Kook's Kits that please tourists. Ask Your Dealer. Send for Catalogue. MANUFACTURERS SINCE 1869. F. CORTEZ WILSON & CO., 247 Lake Street, Chicago, Ill.

THE ENTERPRISE SUPPLY CO.

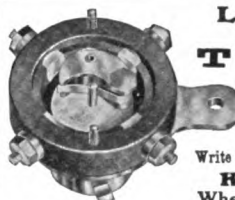
Manufacturers SHERK'S Enterprise Car Renovator Cleans and Preserves Auto Bodies, Tops, Etc. Automobile Curtain Fasteners Railroad, Steamship and Automobile Supplies 501 Commercial Nat'l Bank Bldg., Chicago, Ill.

SE-MENT-OL

will dissolve in the radiator and stop any leak or fix any cracked water jacket

Agents Wanted Everywhere Northwestern Chemical Co., Marietta, O.

BOLT CLIPPERS PORTER PORTER PORTER EVERETT, MASS. U.S.A.

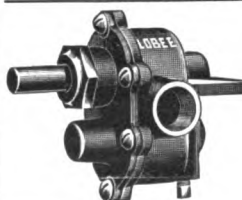


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Manufacturers of TIMERS BUICK SPECIALS Mica and Porcelain SPARK PLUGS Built for Service Write at Once for Booklet and Prices KOKOMO, IND. When You Buy, Buy the Best



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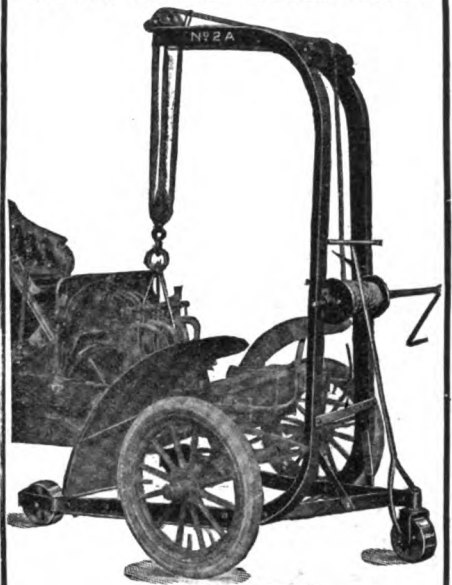


If you want good circulation on your automobile, launch or motor boat, use a LOBEE PUMP Write us at once, and we will tell you why, and send price list. Address LOBEE PUMP AND MACHINERY CO. 14-18 Erie St., Buffalo, N. Y.



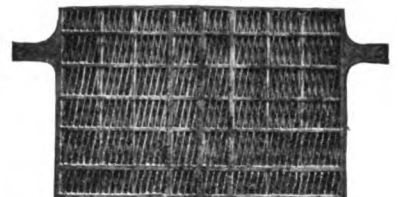
ESTABLISHED 1873. \$60 Lathe. Gap Lathes. Turret Engine Lathes and Shapers. Screw Cutting, Foot and Power Lathes, Hand and Power Planers, Hand and Power Drills, Chucks, Emery Wheels, Outfits. Tools especially for Blacksmiths, Electricians and Bicycle work. Catalogue Free. SHEPARD LATHE CO., 141 West 2d Street, Cincinnati, Ohio.

Hercules Portable Crane Hoist



Patented December 19, 1905 See how easy it does it. Fills the bill for Automobile Factory and Garage Crane. Many of them using it. You should. Send for descriptive circular. WILLIAM S. NICHOLLS, Hoosic Falls, N. Y.

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(Patent Applied For.) Saws to almost any size you want and leaves a solid closed edge. Measures 8 1/4 x 5 1/2 x 7/8 thick. No delay waiting when you use the "Handy." Just the thing for storage battery repair men. "All you do is saw it thru." Send your order to-day for a dozen. The price of course is reasonable. Electrical Maintenance & Repair Co., Mfrs., Main office, Sunday Call Bldg., Newark, N. J. Pamphlets now ready, sent on request. Our "Noflux" Aluminum Solder works well.



GET THE Gardner Air Pump

For Your Garage

Made with air or water cooled cylinders. Self-oiling. Reliable and Efficient. Water Cooled, List, \$50. Air Cooled, List, \$35. Write us. Gardner - Rix G. Co. Quincy, Ill.



READRITE POCKET METERS

Noted for Accuracy, Durability and Permanency. Written guarantee for one year with each meter. Ammeters, \$2.50 Volt-meters, \$3.00 Volt-ammeters, \$3.50 & \$4.00 Write for Circular and Discount to Trade. Read-Rite Meter Works 18 Main St., Bluffton, O.

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Free Trial

You pay nothing—you promise to pay nothing! At my expense—even to the expressage—I will place the Fox Visible Typewriter in your office, or home, alongside your present typewriter—or for comparison with any other typewriter—and if the Fox Visible Typewriter is not better than the

best of the others—not merely "just as good"—I don't want you to buy it.

To Automobile Dealers

If you knew positively that by the persistent and judicious use of a typewriter you could in 1910 **double your last year's business** you wouldn't hesitate an instant in purchasing one!

We have just issued a large illustrated folder showing how the big city concerns have built up their immense businesses and shows how **anyone in any class of business** can increase that business by means of the typewriter. There are hundreds—yes, thousands—of persons in your territory who are interested in Automobiles, and Automobile Supplies and Repairs, and these parties are going to purchase **somewhere**. Why not send to-day for this folder and let me show you how the typewriter will enable you to get this business?

The new **FOX VISIBLE TYPEWRITER** represents to-day the highest type of typewriter building and is **absolutely unequaled** by any other typewriter on the market. It gives full Visible Writing, has a back Space Key, Tabulator, Two-color Ribbon with Automatic Movement and Removable Spools, Interchangeable Carriages and Platens, Line Lock, Stencil Cutting Device and Changeable Speed—it is extremely **Durable** and **almost Noiseless**.

I belong to no trust—no combination—and no one dictates to me at what **PRICE** I shall sell or on what **TERMS** I shall sell.

All I want you to do is to fill out the attached coupon and send it to me personally. Send for my catalog anyway.

SENT ON FREE TRIAL

Date _____ 19__

W. R. FOX, President, Fox Typewriter Co.,
6801-6811 Front St., Grand Rapids, Mich.

Dear Sir:—Please mail me a copy of your catalog and show me how I can increase my business by means of a typewriter. I saw your advertisement in the **AUTOMOBILE DEALER AND REPAIRER**.

Name _____

Address _____

Business _____

H2

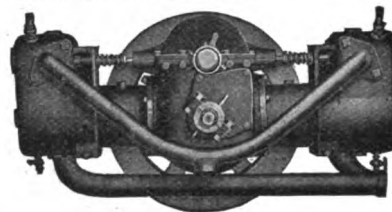
F. W. Ofeldt & Sons,
Nyack-on-Hudson, N. Y.
Manufacturers of

Blue Flame Kerosene Burner,
Safety Water Tube Boiler,
Automatic Water Regulator,
Automatic Fuel Regulator,
Feed Water Heater,
Compound Steam Engines,
New Automatic Fuel Feed.
For all makes of steamers, including White's and Stanley's. Write for new Catalogue.

The Beilfuss Double Opposed Motor

Makes a hit wherever used on account of its compactness.

Can be placed in any car from the small Olds Runabout to the larger sized cars.

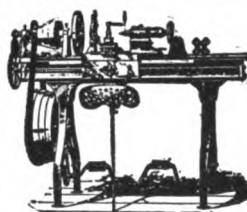


Made in two sizes:
10-12 H. H. P. and 18-20 H. P.
Water Cooled.

Write to day for Circular and Prices.
Simplest and Strongest Motor Built.

Beilfuss Motor Co.
LANSING, MICH.

Please mention the Auto Dealer and Repairer.



THE BARNES LATHES

9' swing
11' swing
13' swing

For Repair Work our No. 13 Lathe is right; has 13' swing, auto cross feed, length of beds from 5 to 10 feet long; furnished with counter-shaft or foot-power.

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NEW LEATHER IN YOUR AUTO FOR \$1.00

Enamelac Leather Finish in Five Colors.

Will restore the color and finish, or change the color of leathers and imitation leathers that have become worn, soiled and discolored. Is water-proof. Sufficient amount to refinish the leather in large car for \$1.00.

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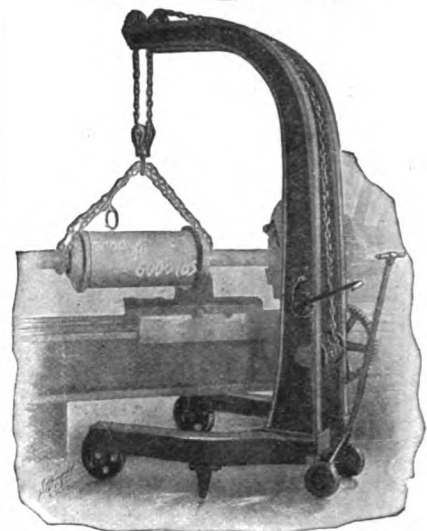
THE ENAMELAC VARNISH COMPANY
108 MAIN STREET RACINE, WISCONSIN.

GAS ENGINE BROKERS.

We save our patrons from 30 to 60% on any **Style, Type or Size of Engine**, whether for **Stationary, Portable, Marine, Automobile or Aeroplane** work. **Everything in the Supply and Repair line, for Any Size or Make of Engine.** Expert Engineers furnished on short notice. Correspondence, Consultation Free. Agents Wanted.

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HOIST FOR AUTOS



ONE MAN DOES WORK OF TWENTY WITH OUR PORTABLE FLOOR CRANE AND HOIST. Pays for itself dozens of times. **CONSTRUCTION**, absolutely stiff. Cannot bend. Order at once at right price. Don't delay. Write—NOW.

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"UNIVERSAL" AUTO TURNABLES.

Pump for Private Garage.

This cut of the Eastern Pump is our specialty for Private Garages where they want the very best that is made at a reasonable price.



The Pump in the above cut pumps a given quantity to a stroke of the lever, and is fitted with shut-off valve and anti-drip nozzle; also fitted with hose connections. It is made of the best material and workmanship that can be put into a Pump.

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Eastern Oil Tank Co.

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PACKARD CABLE



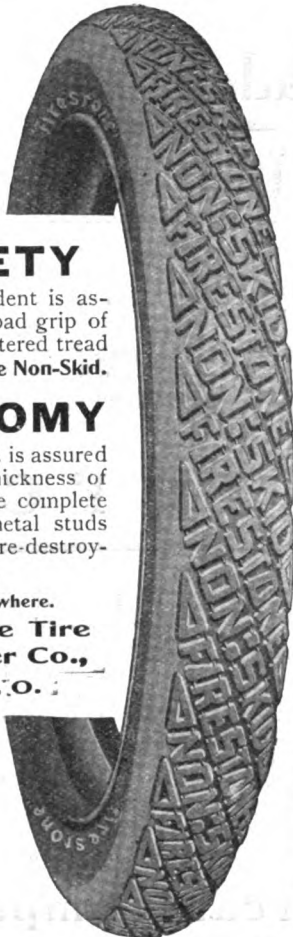
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MAPS AND GUIDES FOR AUTOMOBILISTS.

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SAFETY

from skid-accident is assured by the road grip of the peculiar lettered tread of the **Firestone Non-Skid**.

ECONOMY

in mileage cost is assured by the extra thickness of rubber and the complete absence of metal studs and all other tire-destroying features.

Sold Everywhere.

Firestone Tire & Rubber Co.,

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Kearns Model "L"
For 1910

\$750.00

Wonderfully Simple
and Simply
Wonderful.

GEARLESS — CLUTCHLESS — VALVELESS — PUNCTURELESS

All objectionable features which have been a source of annoyance to automobile users have been dispensed with in the "Kearns." No waiting, no delay, always ready: Friction transmission, two-cycle air cooled 3-cylinder motor, 18 H.P., are the **IDEAL** features incorporated in the "Kearns." It is a summer or winter vehicle of pleasure, a physician's or business man's car, and a business getter in city or country. Built from the ground up on scientific principles, and must therefore not be misconstrued for a motor buggy that is only assembled and sold at a low price. Consider quality and compare with cars selling at 50 per cent more, and note every time that the "Kearns" competes in construction and style, but sells at a price the average man can afford to pay for a reliable automobile. Let us send you full particulars and catalog. 10 Models to choose from. 1910 output estimated at 1000 cars.

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The "Boilerless" Steam Vulcanizer

Underneath the square semi-steel body is fitted our special gas burner, thus doing entirely away with boiler for inner tube work.

Gasoline burner and tank supplied instead of gas if desired.

Furnished complete with steam gauge, safety valve, filling valve, air cock, and our well-known quick acting clamps. **LOW COST. HIGH SATISFACTION.** Immediate shipment. Write us to-day.

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64-66 SOUTH CANAL STREET, CHICAGO, ILL.

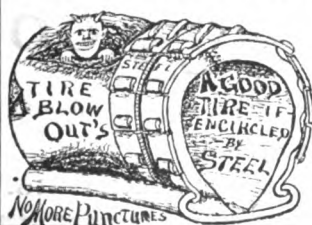
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BRAKE BAND LINING

WEARS INDEFINITELY
SOLD BY ALL FIRST CLASS DEALERS

Manufactured by THERMOID RUBBER CO., Trenton, N. J.

PROTECT YOUR NEW TIRES. REPAIR THE OLD ONES.



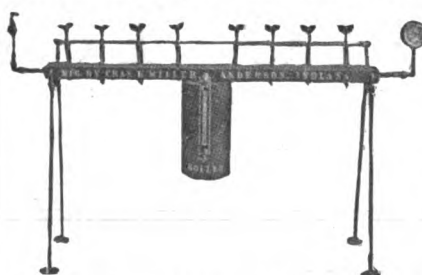
Tires
Will Last
Forever

Steel Link
Bands

Hooks to
Rim

You can fix Blowout quick. If tire is completely covered by these clamps you cannot have Blow-outs, Punctures, Rim Cuts or Wearing off of tire. (Any old tire is good. How can it get away if encircled by steel?) As flexible as ever. Anti Skid.
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MILLER'S INNER TUBE VULCANIZER.



Has a tube plate 54 in. long and 4 in. wide with plain surface highly polished, complete with stand, 12 flue boiler, gas or gasoline burner, water glass, pop valve, steam gauge, 8 clamps and two molds for curing the treads of casings, price \$30.00 Tube plate only with steam gauge and 6 clamps, price \$10.00.

We also manufacture various other vulcanizers. No. 1 and No. 2 adjustable sectional vulcanizers, complete with boiler, \$35.00 each. Bicycle vulcanizers, \$7.50; Motor cycle vulcanizers, \$12.50; Tread Rollers, \$12.00; Kettles, \$115.00; Power wrapping machines,

\$175.00 each. Also special round molds with flush joints for splicing inner tubes. We do all kinds of tire repairing and carry a large stock of tires at reasonable prices. If further interested in vulcanizers write for catalog and special proposition.

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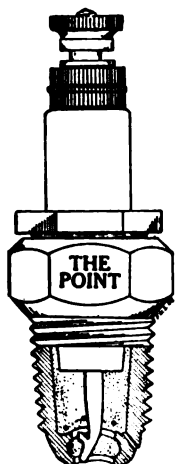
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**Wrapped Tread and Moulded
Clincher Tires and Inner Tubes.**

It will pay you to speak quickly
for your 1910 requirements.

MATTSON RUBBER CO.
LODI, N. J.

NEW YORK STOCK ROOM:
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P. S.—We have for many years made a
leading specialty of Automobile Tire Re-
pair Stocks and Fabrics for the repair man.



THE POINT SPARK PLUG

Patented June 15, 1909

The Point

Spark Plug is a necessity on all engines that
use large quantities of lubricating oil, such as
small, rapid engines, air cooled automobiles
and motor cycles.

The Point

will give any service that an ordinary plug
will—and then some.

GUARANTEE

Any defective Point Spark Plug will be replaced if
returned to the manufacturer. Any broken Spark Plug,
returned with five cents to the manufacturer will be
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SIZES— $\frac{1}{2}$ inch, Standard A. L. A. M., $\frac{3}{4}$ x 18 and Metric.

PRICES—The Point Spark Plug any size, \$1.50.

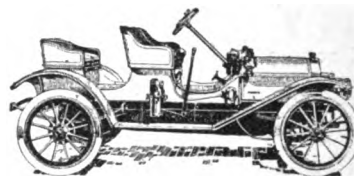
See us at the Chicago Show, Feb. 5-12,
Space 13, First Regiment Armory.

Manufactured by **THE POINT SPARK PLUG CO.,**
Manufacturers of Motor Accessories,
112 11th AVE., S. E., ABERDEEN, S. D.

Bad Roads Don't Matter

If It's A

"The Car
Ahead"



**\$1,100
Completely
Equipped
Including
Magneto**

Cartercar

The Cartercar has but very few
parts and is a wonderfully simple
automobile.

It has a friction transmission and
chain-in-oil drive.

This gives an unlimited number of
speeds, and delivers the motor power
to the rear wheels with very little loss.

For these reasons bad roads, hills,
sand, etc., don't matter with the
Cartercar.

A boy can learn to drive and care
for a Cartercar in a short time.

Its mechanism is so simple, that it
is practically impossible to injure it
in operating.

The Model "H" as shown above
is \$1,100; with double rumble seat
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Magneto, gas lamps, generator, oil
lamps, horn, tools, jack, etc., included
in equipment.

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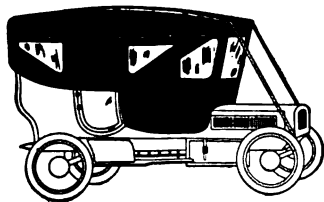
Cartercar Company,
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C. O. T. TIRE PATCHES



Mr. Dealer and Owner! Have you ever thought that to
make a good repair you have got to have the correct article?
You can get it in our Patches. They are made to absorb the
cement, and have a heavy center and feather edge. Can be
obtained from all jobbers.

C. O. TINGLEY & CO.,
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AUTO TOPS, \$25.00

Auto Bodies in the White, Painted or Trimmed. Write for Auto Catalogue and quotations.

BUOB & SCHEU,

Wind Shields and Dust Covers.

No. 1000 Broadway, Cincinnati, Ohio.



THE BUFFALO ELECTRIC VULCANIZER

Will enable you to REPAIR YOUR OWN TIRES.
THREE TIMES THE LIFE.

A NECESSITY FOR EVERY AUTO OWNER.

FREE

Send for our Booklet "TIRE TROUBLES," with description of Vulcanizer, to-day.

BUFFALO ELECTRIC VULCANIZER CO.,
BUFFALO, N. Y.

323 ERIE CO. BANK BLDG.,

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MR. DEALER! ARE YOU ALIVE

to the substantial profits to be derived from fitting cars with **Pyramid Aluminum covered floors?**

This is to-day the live wire of the repair business. By its use is avoided all the troubles and inconveniences of rubber and composition flooring. It is

CLEAN—DRUABLE—ELEGANT ECONOMICAL.

The price of rubber matting is rapidly advancing and cars can be fitted with aluminum floors at but little over the cost of rubber matting.

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Write for details and prices."

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Don't Let This Hole Get Larger.

No matter how carefully you drive your car, your tires are going to be nicked or cut, some time.
No matter how slight the nick or how expensive your tire, it will be only a short while until a sand blister forms and then a blow-out, unless you seal that cut **immediately**.
A pinch of **KNEAD-IT** kneaded into a cut, **immediately** that you discover it, will seal it more securely and at less expense than vulcanization.

No suction can draw it out or weaken it—it is there to stay.
KNEAD-IT sets quickly, seals securely and sets so permanently that it becomes a part of the tire.
It is a new preparation, perfected after years of scientific experiment and experience.

The rise in tire prices does not worry the man who uses **KNEAD-IT**, he fills the cuts in his tires with it and prevents rotting the fabric and does away with sand pockets and blow-outs.
INCREASES TIRE SERVICE THREEFOLD.
50 cents a can, enough for a dozen cuts.

At all dealers, or direct

THE M. & M. MFG. CO., Akron, O.

Tire Expenses are Lion-like in Size.

They gobble up your dollars as fast as the King of Beasts gobbles down anybody that looks digestible.

M. and M. Cement and Acid is mouse-like in size, the whole outfit is small and modest in cost, but when tire troubles threaten you can depend upon M. & M. Cement and Acid to gnaw down lion-like tire expenses in jig time.

Ordinary cements are supposed to withstand 80 degrees of heat; some do—some don't.

Friction often generates 90 degrees of heat between inner tubes and outer casings—that's why ordinary cement patches melt off.

A patch put on with M. & M. Cement and Acid is guaranteed to withstand 212 degrees of heat.

An entire inner tube would melt before it reached 212 degrees of heat (at which water boils)—that's why an M. & M. Cement patch lasts as long as the inner tube.

M. & M. Cement is instantaneous—positive and self-vulcanizing.

Why bother with imitations? A complete M. & M. Outfit only costs \$1.



DON'T BUY NEW TIRES YET!

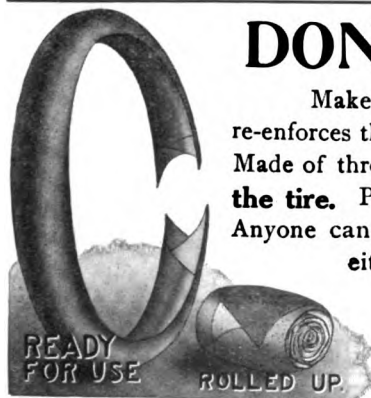
Make your old ones last by using **THE AUTO TIRE RE-ENFORCEMENT**, which re-enforces the whole tire from the inside, the most practical and successful way to strengthen a tire. Made of three and four plies of frictioned fabric, vulcanized and shaped to fit **the whole inside of the tire**. Prevents blow-outs, rim cuts and punctures and adds many miles to the service of any tire. Anyone can apply in a few minutes. They re-enforce the whole tire and cannot possibly injure either tube or casing.

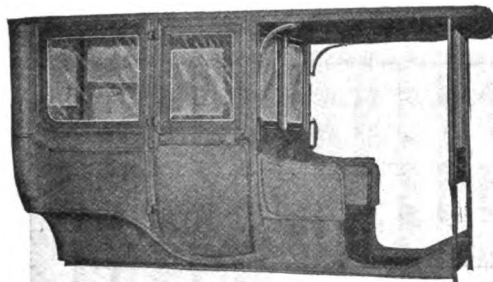
We make all kinds of tire re-enforcements—reliners, inner shoes, tire sleeves, and blow-out patches, and the materials used by us will stand rigid inspection and test.

Send for samples of materials used and get our catalog and prices.

AUTO TIRE RE-ENFORCEMENT CO., E. 7th Street, Auburn, Indiana.

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AUTOMOBILE BODIES.

We are builders of High-Grade Automobile Bodies, in Aluminum, Steel, or Wood Panels.

Limousines, Landaulets, Taxicabs, Touring, or Runabouts. Manufactured in White, or Painted and Trimmed, also Tops for Touring Cars and Runabouts. Get in touch with us at once. Estimates cheerfully furnished. Four years' experience.

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Norwood Portable Turntable, Caster or Jack on Wheels



Pat. Applied For.

Pat. June 25, '07.

3 in 1

A **CASTER** to go under the wheels.

A **JACK** on wheels to go under the axle.

A **Jack** to use on the floor.

Factories and shops can handle cars either with or without wheels. The Jack is adjustable and detachable. Write for Circular E. Discount to the trade.

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GOES INSIDE AND OVER BOTH BEADS.



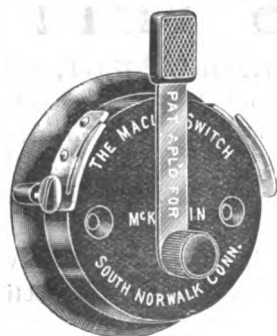
BLOW-OUT PATCH

EQUAL TO AN EXTRA TIRE.

Because twice as quick and just as safe. THE ONLY PATCH made exactly like a tire, of fabric stretched, vulcanized and tested under 250 pounds pressure, so WILL NOT BULGE.

INNER SHOE TIRE CO., Grand Rapids, Mich.

MACLET SWITCH



Has a removable lever and at the same time a spring device for keeping the lever off the contacts when the contact is once broken—thus obviating the familiar annoyance of having the lever fall back and make connection after removing it from the contact point.

EACH IN A NEAT BOX
90 Cents

We also manufacture **Maclet Coils**
For Launches or for Automobiles.

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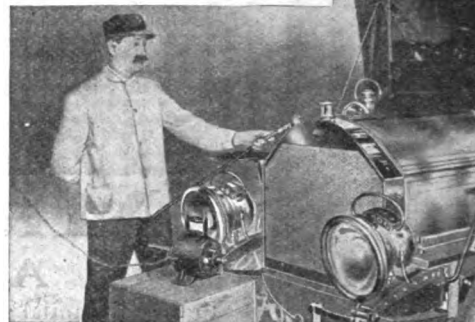
Stow Mfg. Co., Binghamton, N. Y.

Inventors and Mfrs. of the **Stow Flexible Shaft**

Electric Hand Buffer

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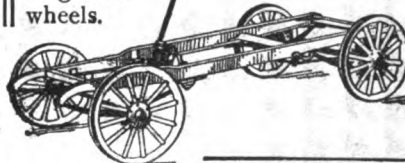
**Automobiles
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Indispensable in an Up-to-date Garage. Write us and mention this Magazine.

AUTOMOBILE

Running Gears, with pressed steel or angle iron frames, also chain or shaft drive. Any wheel base up to 138 inch, and any height of wheels. ALSO ALL KINDS OF **BODIES** Wheels, Axles, Steering Devices, Springs, Etc.



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Twin Grip WRENCH

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Seven different Wrenches and Screwdriver.

Including Alligator Wrench. A high grade tool made of tempered cast steel, nickel plated. Cannot rust. MAILED ON RECEIPT OF ONE DOLLAR. Send for Dealer's Price. Manufactured by **BURKLEY SUPPLY CO.,** 25 Old Slip, New York.

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THE DOW PERFECTED MAGNETO

For the Man Who Drives His Own Car and for the Chauffeur Who is His Own Mechanic.

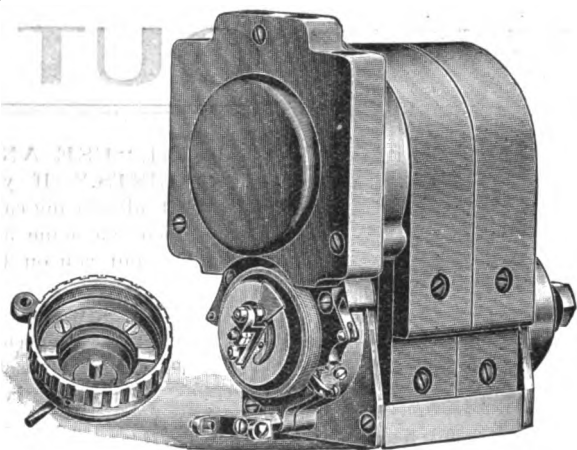
High Tension Alternating Current. Arc Flame Spark of great electrical heat. Most complete combustion.

Full Efficiency of Fuel. Added Power to the Motor for Hills and Hard Going.

Sparks at a Finger-turn. Starts motor on quarter-throw of the crank. Absolute, positive Ignition at the slowest engine speeds, with timing lever fully retarded.

Cleaner Engine. No sooty cylinders, no fouled plugs, no sticky, pitted valves.

A Magneto absolutely free from the troubles which are present in other ignition systems.



To any responsible person we will sell the Dow Perfected Magneto on a bona-fide

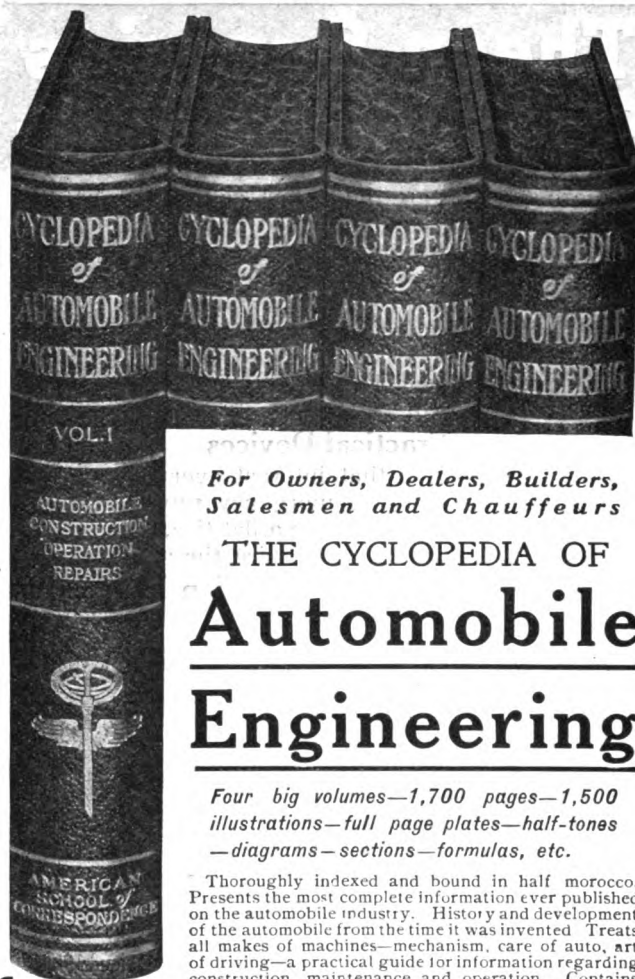
THIRTY DAYS' TRIAL.

Every Dow perfected Magneto is covered by an

UNLIMITED GUARANTY restricted only against sledgehammer methods and amateurish curiosity.

We have a complete line of ignition supplies. Write for details. Send for Important Ignition Facts.

DOW MANUFACTURING CO.,
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For Owners, Dealers, Builders, Salesmen and Chauffeurs

THE CYCLOPEDIA OF Automobile Engineering

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Thoroughly indexed and bound in half morocco. Presents the most complete information ever published on the automobile industry. History and development of the automobile from the time it was invented. Treats all makes of machines—mechanism, care of auto, art of driving—a practical guide for information regarding construction, maintenance and operation. Contains complete instruction on repairing. Written by experts.

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Automobile Operation—Care—Trouble—Breakdown—Repairs—Motor Cycles—Automobile Power Plants—Cooling and Oiling Systems—Ignition Systems—Spark Coils—Buying a Motor Car—Gasoline, Electric and Steam Cars—Tires—Punctures—Accessories—Driving—Gas and Oil Engines—Fuels—Care of Gas Engines—Electricity—Storage Batteries—Direct Current Motors—Mercury Vapor Converter—Primary Batteries—Steam Engines and Boilers—Valve Gears—Indicators—etc.

For a short time we will include, as a monthly supplement, for one year, the TECHNICAL WORLD MAGAZINE. This is a regular \$1.50 monthly, full of Twentieth Century Scientific facts, written in popular form. Also contains the latest discussion on timely topics in invention, industry, etc. The magazine will be mailed immediately upon receipt of coupon.

American School of Correspondence, Chicago, Ill., U. S. A.

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American School of Correspondence:

Please send set Cyclopedia of Automobile Engineering for five days' free examination; also Technical World for 1 year. I will send \$2.00 within 5 days and \$2.00 a month until I have paid \$12.80, or notify you and hold the books subject to your order. Title not to pass until fully paid.

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Auto Dealer and Repairer—2-10.

These Sundries Sell Themselves

These sundries are the fastest sellers because the name **Goodyear** guarantees to the consumer that they are the best on the market.

Then, too, your customer is pleased with the service Goodyear Sundries give him and he asks for them again—he tells his friends to ask for them.

That is why it is easy for you to make more money selling the Goodyear Tire & Rubber Company's Tire Sundries and Repair Materials.

Practical Devices

Here are devices that interest every automobile owner—they solve the emergency repair problem. No need now to run home on a flat tire, thus making it necessary to put on a new tire the next day.



Protection Patches

for use when the outer casing is cut clear through. In such a case it is necessary to fix it up inside and out—the Protection Patch is just the thing.

The outside boot fits smoothly over the casing and laces over the rim with a thong. The tire is thus protected from the working of dirt into the cut.

To prevent pinching the tube and to further protect the fabric, an inside patch fits snugly inside the casing.

For all sizes from 2½ in. to 5 in.—for 2½ in. and 3 in. Tires—inside only 50c, outside only \$1.30, per pair \$1.80. For 3½ in. and 4 in. Tires—inside only 55c, outside only \$1.45, per pair \$2.00. For 4½ in. and 5 in. Tires—inside only 65c, outside only \$1.60, per pair \$2.25.

These Specialties Please the Autoist

In the Goodyear Tire Plasters are combined the utility of a Rim Cut Patch and a Protection Patch—the heavy reinforcement will repair any ordinary blowout. Three sizes, 50c or \$1.00 or \$1.25 retail, for all sizes from 2½ inches to 5 inches.

Then there is the Good-year Inner

Tube Bag to carry extra tubes. This bag will protect them from contact with oils, grease and sharp tools. Holds 2 or 3 tubes, according to size. Retail \$1.25 each.

The new Rim Cut Patch makes an emergency repair on a rim cut tire easy. This patch is heavily reinforced so as to prevent blowout along rim and is equally good for any other cuts or blowouts in casings, as the heavy reinforcement extends over entire surface. Retail 75c, \$1.00 and \$1.25, according to size.

Inner Tube Patches that Stretch with the Tube

In order to make a good repair on an inner tube you must have a patch of such material as will stretch with the tube. A good tube demands a good patch.

The inner surfaces of these patches are rough so as to give the cement a firm hold. The edges are very thin—friction cannot tear them loose. Retail prices from 4c each to 20c each, according to size and shape.

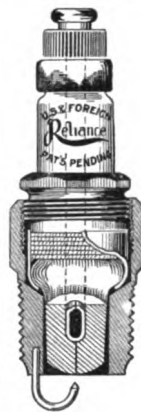
You will enjoy our book "Care of An Auto Tire." It tells you how repairs that stay repaired are made. We will be glad to send it upon request.

The Goodyear Tire & Rubber Co.

Sprague Street, Akron, Ohio

Branches in all the Principal Cities.

[12]



Regular Type, \$1.00

The Regular Reliance is the famous "Spark in Water" Plug known the world over as the plug that can't short circuit. Electrically different from any other plug—with every part accurately machined, making them mechanically as well as electrically correct.

Magneto Type, \$1.25

The Reliance Magneto Plug is designed along the Regular Reliance principles, but built especially for service when the current is generated by a magneto. It is especially desirable and serviceable when an excess of oil is used.

Send to day for interesting booklet—with it we send the most puzzling electrical novelty of the day—sent for the asking.



JEFFERY-DEWITT CO.,

Spark Plug Manufacturers,

231 HIGH STREET, NEWARK, N. J.

S. & F. Stephenson, Agents for United Kingdom,
10 Canning Place, Liverpool, England.
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Berlin, Germany.

JUST OUT!

WRITE for our new 24-page booklet, "USE AND CARE OF MAILING LISTS." If you are at a loss to plan your Fall advertising campaign, or if you are hesitating between magazine and direct advertising, this booklet will put you on the right track.

If you are at present using Mailing Lists, we may be able to give you some new ideas as to the expeditious and economical handling of them. The book is full of useful suggestions for the advertising manager. It also gives a synopsis of all the state registration laws.

We Make No Charge.

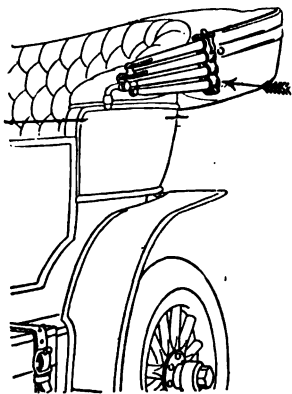
The book is free to the advertising manager. We only ask that you write us on your firm's stationery, as we have only a limited number of the books and we do not care to waste any copies.

Automobile Advertising Company,

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We will be glad to instruct you as to the cost and how to install a card filing system, or to figure out the cost of a circularizing campaign.

USEFUL, DURABLE,
ORNAMENTAL.



TOP TROUBLES STOP

WHEN THE BAIR AUTO TOP HOLDERS (Pat'd) ARE USED

THEY ARE SUPERIOR TO ALL OTHER DEVICES OR COMBINATIONS NOW IN USE, and absolutely prevent jarring, jolting, chafing, rattling, or broken bows. No Straps or Buckles.

Practically Indestructible. Easily Applied. Easily Operated.

WEIGHT. The holders keep the entire weight of the top off the lower bow. The top cannot come down with a bang on the bottom bow every time the car hits a rut.

FIRM. The entire top is held as in a vice in such a manner that the top becomes part of the car. The weight, jolting, etc., is then transmitted to the springs of the machine—where it belongs.

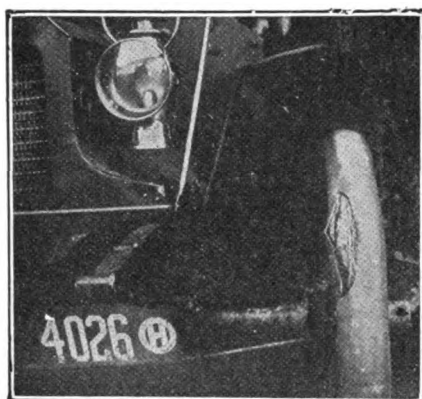
MONEY BACK IF NOT SATISFACTORY.

Ask Your Dealer for Demonstration or Send for Illustrated Catalog. Dept. "B."

AUTO SPECIALTIES MFG. CO.,

Room 811.

79 Dearborn Street, Chicago, Ill.



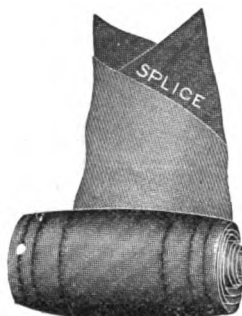
K & W PATENT RELINERS are so successful that Tire Experts believe we have solved the TIRE PROBLEM.

Milwaukee, Wis., Aug. 16, 1909.
Gentlemen:—Enclosed please find order for fifty of your Reliners. Within the past three months we have used about three dozen of these Reliners, and up to date they have given excellent service. We have not received one complaint in this course of time.

Yours truly,
Milwaukee Tire Repair Co.

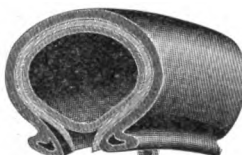
EASILY INSERTED. PICTURE SHOWS ONE IN SERVICE. "Write FOR OUR PROPOSITION, ETC."

K & W MFG. CO. Ashland, Ohio.

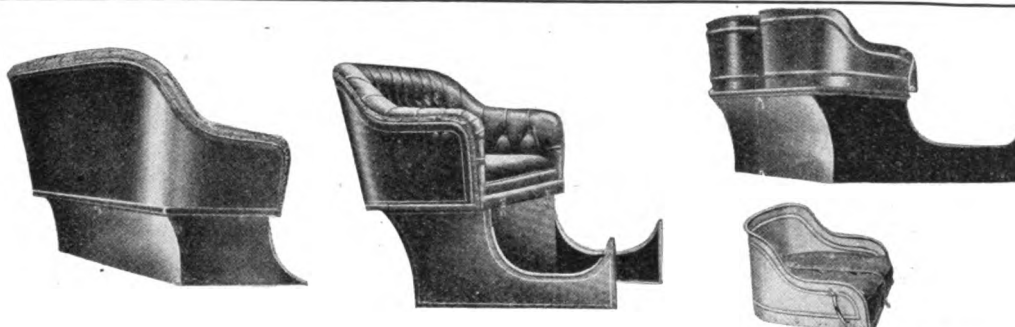


K&W RELINER BEFORE INSERTING.

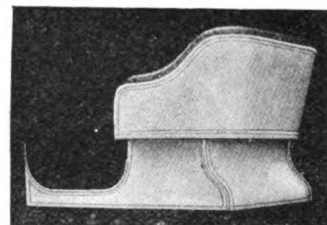
Pat'd Dec. 28, '09.
Jan. 4, '10.



AFTER INSERTING INNER TUBE.



Send for Catalogue "L" and Prices.



SEATS = The Pictures tell the Story

Buick, Model 10
Ford, any model
Maxwell, " "
Brush

Reo
Mitchell
Cadillac
E. M. F. 30

Hudson 20
Chalmers-Detroit
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De Tamble

Parry
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Hupmobile
Winton
Overland
and others

If you are the owner of a Ford Runabout, write us at once. We will present you with a NEW CAR for \$385.50.

AUTO REBUILDING CO., 1311 Wabash Ave., Chicago, Ill.

Empire Tires

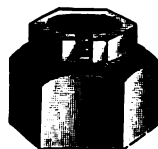
WEAR LONGEST

EMPIRE TIRE COMPANY

Branches and Agencies in all the Leading Cities

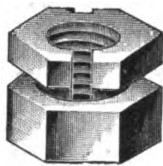
Main Office and Factory, TRENTON, N. J.

A NECESSITY ON AUTOMOBILES !!!



ORIGINAL.

What?



IMPROVED.

COLUMBIA LOCK NUTS.

They Will Not Shake Loose.

A LOCK NUT, NOT A NUT LOCK.

Let us send you one without charge to fit that bolt you had trouble with yesterday.

What Size Was It ???

Our "Green and Yellow" booklet tells "WHY" nuts shake from bolts.

What a comfort to ride in a car when you are sure every nut is tight on frame, engine and steering gear.

Try us and tell your friends.

COLUMBIA NUT AND BOLT CO., Inc.,
BRIDGEPORT, CONN.

THE NEW 1910 MODEL OF THE

"Ideal" Lawn Mower Grinder



"You Grind It as You Find It."

Grinds the Reel Knives to fit the straight blade, even if the latter is bent and out of shape—the most important feature of lawn mower sharpening. Has 5-in. ball-bearing grinding wheel, babbitted bearings, twice as easy running as any other. Grinds either right or left-hand mowers perfectly in fifteen minutes without removing ratchets or wheels. We are the originators, and seven years' experience has shown us how to make them perfect. Nearly 4,000 now in use.

Send for circular giving full information and prices. WRITE TO-DAY.

The Heath Foundry and Manufacturing Co.
(Successors to The Root Brothers Company)
Plymouth, Ohio



Don't Lose This Profit!

Prest-O-Carbon Remover does a better job than scraping out the carbon, is better for the engine, quicker and easier.

It saves money for your customer, and yet makes more money for you.

PREST-O-CARBON REMOVER

Consumes little shop time and labor. Charge your customer \$8 to \$5 for a thorough job. There's good money in this.

And don't forget that your customer will have his engine cleaned often, if the price is right.

The same liquid is used over and over again—little waste or expense to you. Someone in your town is going to attract profitable trade on this!

Order some of this liquid, and write us for full information. Retail prices: Gal., \$3.75; Half Gal., \$2; Quart, \$1. In cans. Guaranteed.

The Prest-O-Lite Co., 251 East South St.,
Indianapolis, Ind.

Branches at New York, Boston, Philadelphia, Cleveland, Chicago,
Detroit, Providence, Minneapolis, Omaha, Dallas,
Los Angeles, and San Francisco.

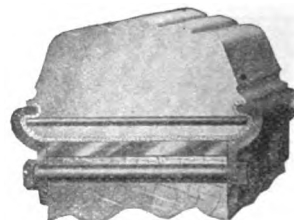
1910 IMPROVEMENTS IN SWINEHART TIRES

Mean More Mileage,

Less Expense.

No Delays.

Dollars Saved.



Consider, Mr. Dealer, the advantages of Swinehart tires and rims before stepping into the uncertainties of the 1910 season.

Consider, Mr. Dealer, that customers are no longer buying tires simply because they are cheap.

Consider, Mr. Dealer, that it costs a truck owner from \$20 to \$50 each day his truck is out of commission for tire repairs, and,

Consider, Mr. Dealer, that Swinehart tires and quick detachable rims eliminate all these expensive delays.

FLANGE RIM FOR TRUCK TIRES.

Most secure and simple.

An amateur can apply the heaviest truck tire in 30 minutes without any other tools than an ordinary wrench. No delays on account of tire troubles.

MOTOR BUGGY SPECIAL.

Easiest riding cushion tire—endless—no joints. Easily applied by anyone. Improves riding and steering of car. Outwears several sets ordinary tires.



See Us at New York Shows
with Full Line of
Solid and Pneumatic Tires.

We Have the Best Proposition
Ever Offered for One Agent in
Each City.

THE SWINEHART CLINCHER TIRE & RUBBER CO.,

Akron, O.

Please mention the Automobile Dealer and Repairer when writing to advertisers.

A STICKING SUCCESS

Can use it on the road or at home



Try C. O. T. Gum Gum to fill up the digout in the rubber of our outer casing.

A Four Ounce Tube by mail, 50 Cents. Send for Circular.

Chas. O. Tingley & Co.,
RAHWAY, N. J.

ESTABLISHED 1896.

See that C. O. T. is on every label. For Sale by Dealers everywhere

THE "INNERSHU"

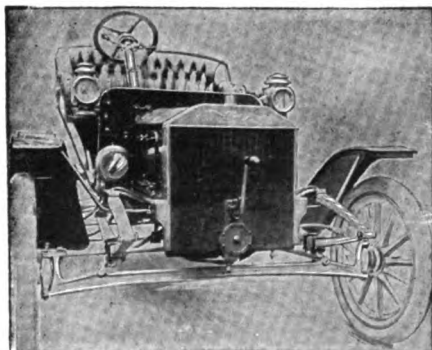
MAKES YOUR TIRES LAST TWICE AS LONG.

Puncture
Proof.
Prevents
Blow
Outs.



Easily
Applied.
Not
Expensive.

The Only Scientific Method to Double Tire Durability.
ASK YOUR DEALER OR WRITE
INNER SHOE TIRE CO., Grand Rapids, Michigan



Shumard's Front Spring Outfit for Ford Cars.

Patents Pending.

The most decided improvement ever made on a finished car of standard manufacture.

The difference in the riding and operating qualities is noticeable at once, and the surprise is a delight.

The safety of the outfit over the single spring cannot be figured in dollars and cents.

The greatly improved appearance is striking and produces favorable comment.
HUNDREDS ALREADY SOLD.

Brackets and perches are now made of Vanadium steel with a tensile strength of more than 140,000 lbs.

Springs are the finest quality, tempered in oil, and carefully tested.

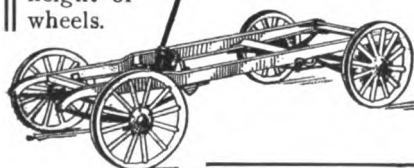
Finished, painted and carefully packed in wood box.

Liberal discount to legitimate dealers. Write for further particulars and price to

THE SPECIAL MOTOR VEHICLE CO., Cincinnati, Ohio.

AUTOMOBILE

Running Gears, with pressed steel or angle iron frames, also chain or shaft drive. Any wheel base up to 120 inch, ALSO ALL KINDS OF BODIES. Wheels, Axles, Steering Devices, Springs, Etc.



WRITE FOR OUR NEW CATALOG AT ONCE.

BORBEIN AUTO CO.,
2109 & 2111 N. 9th ST.,
ST. LOUIS, MO.

Hello Sheldon!

"While on a railroad train in Kentucky recently, I was studying my Sheldon lessons; a gentleman came past and said, 'Hello, Sheldon.' He also was a Sheldon student. We discovered there were two others in the car, making a total of four out of seven traveling men on the train." **M. E. L. Cramer, American Sales Book Company, 808 National Bank Building, Nashville, Tenn.**

This letter shows two things very clearly; first, that Sheldon students are becoming thick in this country; second, that Sheldon lessons help you improve your spare time in a way that means greater efficiency in your business, and hence more money out of your business.

You had better spend some of the time on the train equipping yourself to do more business off the train.

The Sheldon School helps men in every line of work—clerks, stenographers, industrial workers, professional men—as well as salesmen. Read what a former office employee has to say:

"By studying your course I have been enabled to avail myself of an opportunity to accept a position as salesman. The increase of my income amounts to 30 per cent."—**M. C. ARVIDSON, Former Stenographer; now Salesman for the Burroughs Adding Machine Company, P. O. Box 522, Des Moines, Iowa.**

Salesmanship is the best paid of all professions. The salesman's work is pleasant. He travels and becomes rounded out by his association with many kinds of men; a salesman is practically his own boss; so long as the results are right he is free to do his work as he pleases.

A good salesman is never out of a job. There is always a demand for the man who can produce the business.

We have helped hundreds of young men into the lucrative profession of salesmanship.

Employers as well as employees, managers as well as their men, study and endorse the Sheldon Science of Salesmanship. Here is evidence:

"I am a firm believer in Mr. Sheldon's work. I have found it very helpful in my own work, and I think no man who conscientiously studies the Course can fail to benefit by it."—**Wm. H. Ingersoll, of Robert H. Ingersoll & Bros., New York City.**

The principles that helped the men quoted here to greater success will help you. We have thousands of letters like these given here. More than 36,000 men have subscribed to our Courses in five years.

THE SHELDON BOOK tells the story of the Science of Salesmanship, how it came to be founded, how it increased the earning capacity of tens of thousands of sales men, business men and others, how it will benefit you. Every page of the book contains profitable suggestions for you. A postcard request will bring it to you. Address

The Sheldon School

1268 Republic Building, Chicago, Ill.

"Akron" Repair Kit

Makes the repair permanent, as it produces the same effect as vulcanization. The acid cures the cement to the rubber or part to be repaired, which makes it one solid piece of rubber and impossible to separate.



"Akron" Repair Kit
Price, Delivered, \$1.00

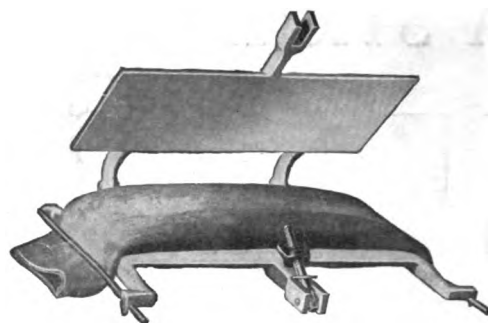
This Pure Aluminum Vise is intended to be used in applying patches to inner tubes. It holds the patches firmly in place while the rubber cement is setting and vulcanizing.

It prevents the patch edges from curling and positively assures you of a permanent repair to your inner tube. For use with any size inner tube. Small, light and strong. An absolute necessity for every automobile owner.

We also make the

"Akron" Inside Repair Patch,
"Akron" Tire Boot,
Motor Cycle Boots and Patches,
Top Dressing for Autos.

Ask your dealer, or write direct. We make regular inner tube patches, six sizes.



"Hold Tight" Aluminum Vise
For Inner Tube Patching,
Price, Delivered, \$1.25

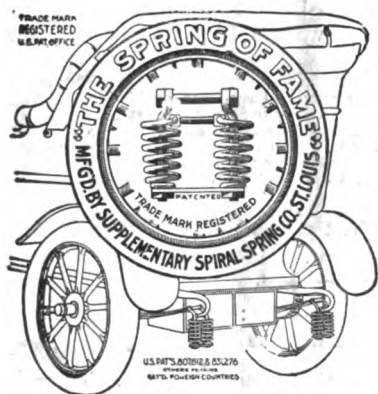
THE EMPIRE MANUFACTURING COMPANY, 20 Beech St., Akron, Ohio

SAVE YOUR CAR

BY ATTACHING OUR

Supplementary Spiral Spring

OVER 15,000 IN USE



Send for "MISSOURI PROOF"—we show you—and our 1908 BOOKLET—it's interesting.

Beware of worthless makeshift single or double coil imitations and infringements.

Liberal NO RISK propositions to the trade.

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"100,000 miles and not a broken side spring."

C. W. NUGENT, St. Louis.

"Am thoroughly satisfied with them."

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"They ride extremely nice."

BRITISH-AMERICAN CO., Coventry, England.

"I cannot praise them enough."—H. L. TURNER, Boston.

"They are everything you claim for them."

Dr. F. E. BUCK, Jacksonville, Fla.

"I cannot understand how I did without them."

LEOPOLD KAHN, New York City.

"Make the car ride very comfortably."

S. N. BRIGGS, Los Angeles, Cal.

The above extracts from a select few letters recently received give an idea of the range of territory in which the Supplementary Spiral Springs are popular. We have too many to print.

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Main Office, 4522 Delmar Ave.
ST. LOUIS, MO.

NEW YORK BRANCH, Motor Mart Bldg., 1876 B'way.

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CERTIFIED COPIES OF THE OFFICIAL LIST OF AUTO OWNERS, CHAUFFEURS, DEALERS, GARAGES, MANUFACTURERS AND JOBBERS IN THE U. S. AND CANADA. ALSO MOTOR BOAT OWNERS

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'Phone 858 Columbus.

DIXON'S Motor Graphite

is being more widely used every day. There is no substitute for it. Saves wear, time and trouble. Write for a free sample and descriptive booklet.

Joseph Dixon Crucible Co.

JERSEY CITY, N. J.

AUTOMOBILE DEALER AND REPAIRER

A PRACTICAL JOURNAL EXCLUSIVELY FOR THESE INTERESTS
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Vol. 7, No. 2.

NEW YORK, APRIL, 1909.

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PARTIAL CONTENTS:



HOW TO HANG DOORS—Some Information [for Body] Repairers.
Illustrated.

BORE AND STROKE—Advantages and Defects [of Different Lengths.
Illustrated.

AUTOMOBILES IN CUBA—Need of More and Better Tools for Re-
pairs. Illustrated.

TWO AND FOUR CYCLES—Further Comparison of the Qualities of
the Two Engines.

CYLINDER LUBRICATION—Height of Oil for the Splash System and
the Necessity of Good Quality.

CLEANING THE HANDS—The Beginning and End of an Important
Subject.

LOCATING THE TROUBLE—He Did It [After Reflection and Com-
munion With his Pipe.

THE PAINT SHOP—Motor Car Varnish Difficulties and the Work of
Drivers.

AIR-COOLED ENGINES—Their Advantages and How They Do, Their
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TRIPLE ACTION SPRINGS

WILL FIT ANY MAKE OF CAR.

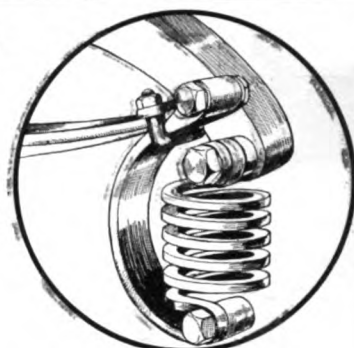
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RAMBLER, CORBIN, LAMBERT, AUSTIN AND HALLADAY COMPANIES.

With the above regular equipment this represents over 6,000 sets. This shows there must be great merit in our spring when the manufacturers pay three times the price over an ordinary spring.

What we claim for our springs is that they ride as easily with one person as under a full load. Our coil spring on the end of a leaf spring acts the same as a pneumatic tire does on a wheel. This saves your tires and engine and prevents your leaf springs from breaking. Our springs need no oiling or adjusting and can be applied to any make of car.

Write for Illustrated Catalogue and Prices. Mention Make of Car and Model.



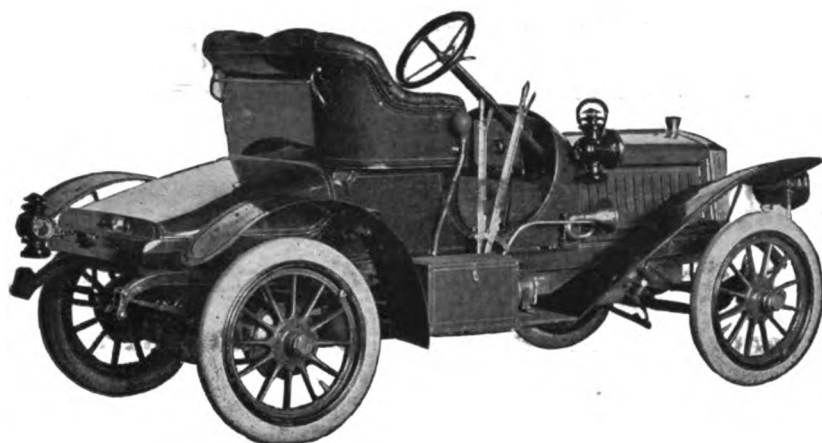
TYPE 12.



TYPE 11.

Triple
Action

Spring Co., 64 East 21st St., CHICAGO, ILL.



This shows a Mitchell H to which an Artz Folding Tonneau is fitted. It is still a run-about, and only 55 pounds heavier; yet the extra seat is there, protected from dust, mud, and rain, and can be opened ready for use in five seconds without the use of any tools. There is room inside for pump, tools, and extra wraps.

\$100 LIST

Made for many other cars.

DEALERS

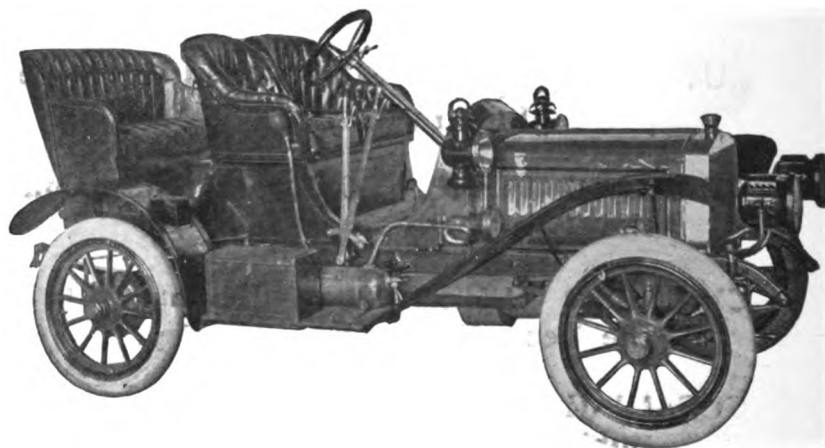
ORDER ONE

This shows the folding tonneau open and ready for use. In this position it is as firm, strong, and comfortable as a standing tonneau, and provides for "the occasional extra two." A Rubber floor mat and all fastenings go with each tonneau.

Dayton Folding Tonneau Co.

Manufacturers Automobile Bodies and
Five Ply Seat Backs.

618 Geyer Street, Dayton, Ohio.



"Akron" Repair Kit

Makes the repair permanent, as it produces the same effect as vulcanization. The acid cures the cement to the rubber or part to be repaired, which makes it one solid piece of rubber and impossible to separate.



"Akron" Repair Kit
Price, Delivered, \$1.00

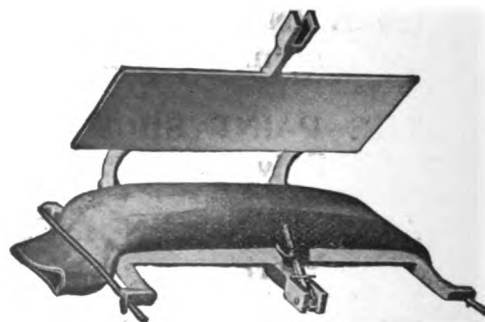
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It prevents the patch edges from curling and positively assures you of a permanent repair to your inner tube. For use with any size inner tube. Small, light and strong. An absolute necessity for every automobile owner.

We also make the

"Akron" Inside Repair Patch,
"Akron" Tire Boot,
Motor Cycle Boots and Patches,
Top Dressing for Autos.

Ask your dealer, or write direct. We make regular inner tube patches, six sizes.



"Hold Tight" Aluminum Vise
For Inner Tube Patching,
Price, Delivered, \$1.25

THE EMPIRE MANUFACTURING COMPANY, 20 Beech St., Akron, Ohio

AUTOMOBILE DEALER AND REPAIRER

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Vol. 7, No. 3.

NEW YORK, MAY, 1909.

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ALL ABOUT LUBRICANTS—The Kinds to Use and How to Test Them. Illustrated.

TAKING A CAR ABROAD—Information as to Details of Shipment and the Expense Bill.

REPAIR TOOLS—Something About the Kinds Most Useful and the Quality. Illustrated.

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A Score or So of Other Practical Articles—All Worth Reading.



THE SPARK PLUG SENSATION OF THE YEAR.

No dealer or repairman can afford to ignore it. It is a money-saver for the user and a money-maker for the dealer.

If you have not received a free sample, write to us on your letterhead or enclose your card and mention this paper and we will send you one spark plug absolutely without cost to you.

Emil Grossman Company, Mfrs.,
232 West 58th St., New York.



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We are in a position to offer a limited number of local dealers a **unique** proposition which will enable each to build up a **substantial, profitable** and **permanent** business of his own for the sale of cars and accessories. For particulars, address

PERMANENT, c/o Automobile Dealer and Repairer, 24 Murray St., New York.

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Tire Troubles Solved by the Wyman Tire Inflator



WYMAN TIRE TANK

With Combination Valve and Gauge.

No public or private garage should be without this outfit.

GET PRICES AND PARTICULARS.

We also manufacture the Celebrated Wyman Whistle Outfit for Motor Boats.

AUTO TIRE INFLATING CO.,

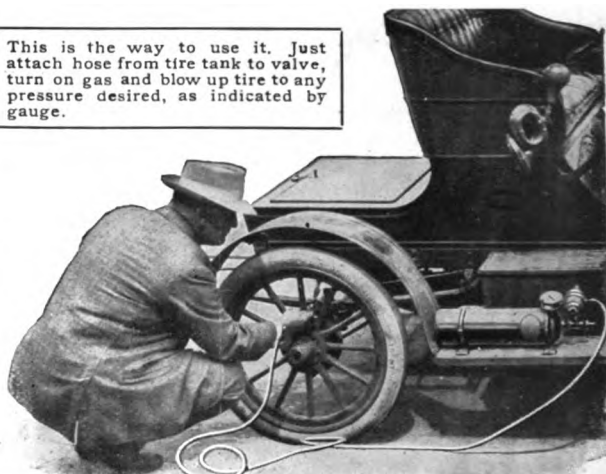
104 South Eighth Street,

BROOKLYN, N. Y.

Keeps your tires just as they should be, and no guess-work about it. . . .

This outfit will save its cost many times over in a single season. . . .

This is the way to use it. Just attach hose from tire tank to valve, turn on gas and blow up tire to any pressure desired, as indicated by gauge.



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WILL FIT ANY MAKE OF CAR.

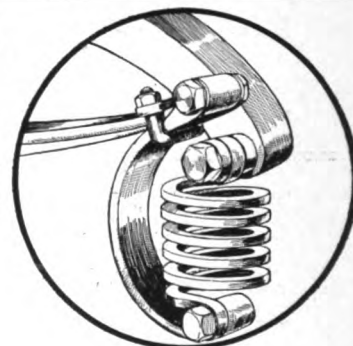
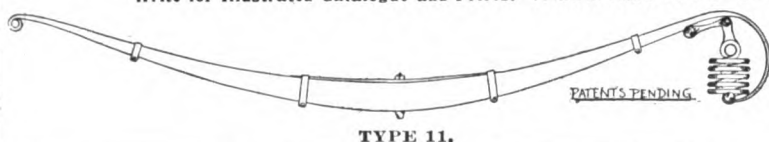
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RAMBLER, CORBIN, LAMBERT, AUSTIN AND HALLADAY COMPANIES.

With the above regular equipment this represents over 6,000 sets. This shows there must be great merit in our spring when the manufacturers pay three times the price over an ordinary spring.

What we claim for our springs is that they ride as easily with one person as under a full load. Our coil spring on the end of a leaf spring acts the same as a pneumatic tire does on a wheel. This saves your tires and engine and prevents your leaf springs from breaking. Our springs need no oiling or adjusting and can be applied to any make of car.

Write for Illustrated Catalogue and Prices. Mention Make of Car and Model.



Triple
Action
Spring Co.,

64 East 21st St., CHICAGO, ILL.

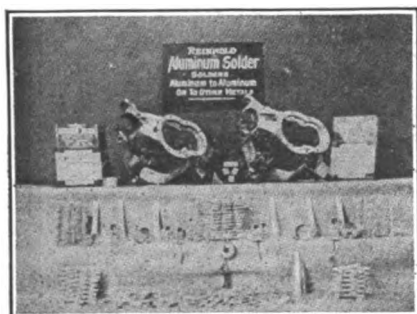
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does the WORK and does it right. Send 25c. or 50c. for sample bars.

Full description and direction sheets free.

Joins aluminum to aluminum and to other metals perfectly. Saves your broken Auto Castings and loss of time waiting for parts.

Thousands of pleased users.



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Vol. 7, No. 4.

NEW YORK, JUNE, 1909.

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PARTIAL CONTENTS:



TESTING WIRE CONNECTIONS—How Loose Wires may be Easily Found and Remedied. Illustrated.

LARGE AND SMALL WHEELS—The Matter of Comparative Advantages Treated Practically. Illustrated.

CAR SEATS—How to Construct, Fit and Repair Them. Illustrated.

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Porcelain



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Mica

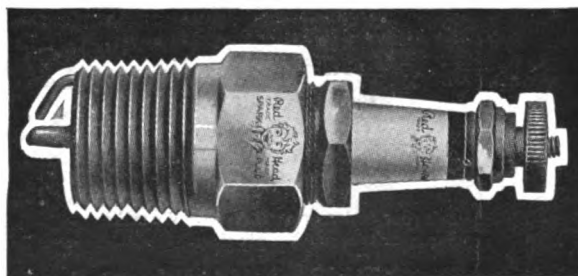


Metric
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Every Customer we gain, we HOLD.

We MUST—if we want to avoid the same fate that befell hundreds of other spark plugs before we were designed, tested out and placed upon the market.

The Name *Red Head*



is your guarantee of the most satisfactory spark plug you ever used.

"Money back" if you don't agree with us. Can anyone do more?

All sizes, all styles, one price, \$1.00.

Send for Booklet "P.A.D."

EMIL GROSSMAN COMPANY,
No. 232 West 58th Street, New York City.

TRIPLE ACTION SPRINGS

WILL FIT ANY MAKE OF CAR.

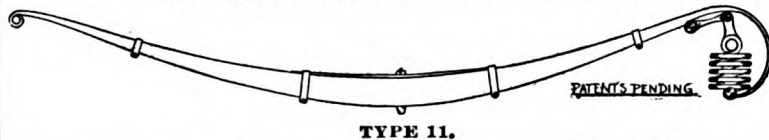
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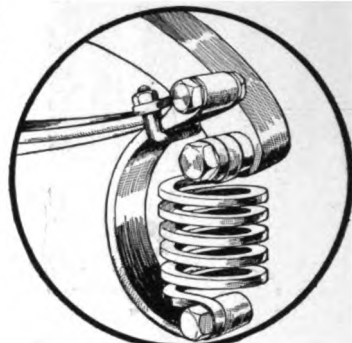
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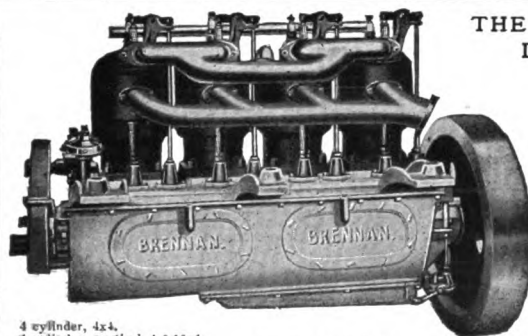
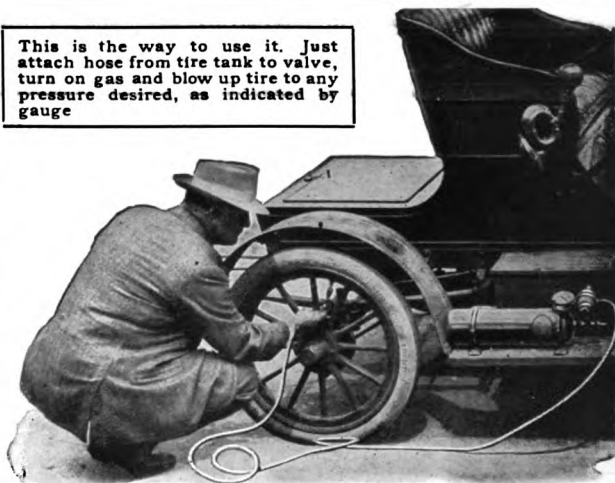
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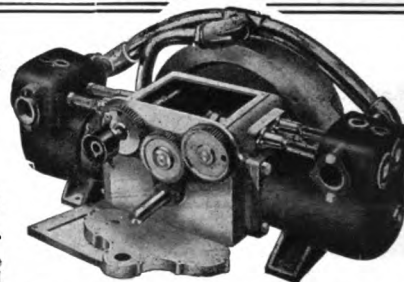


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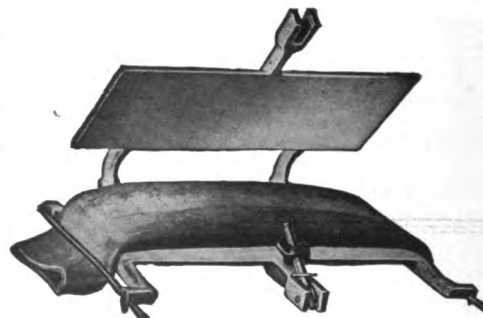
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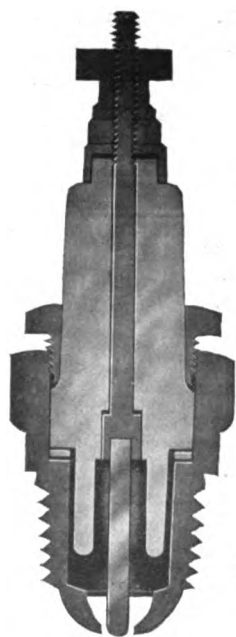
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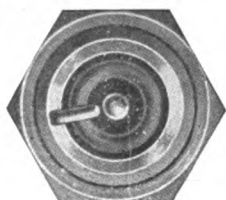
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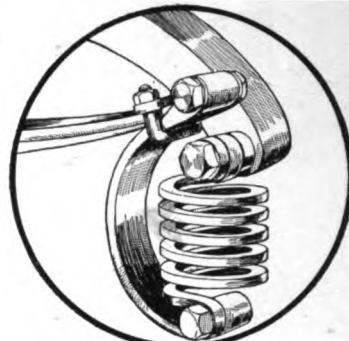
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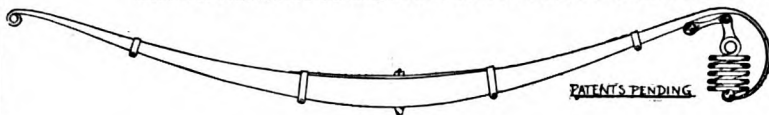
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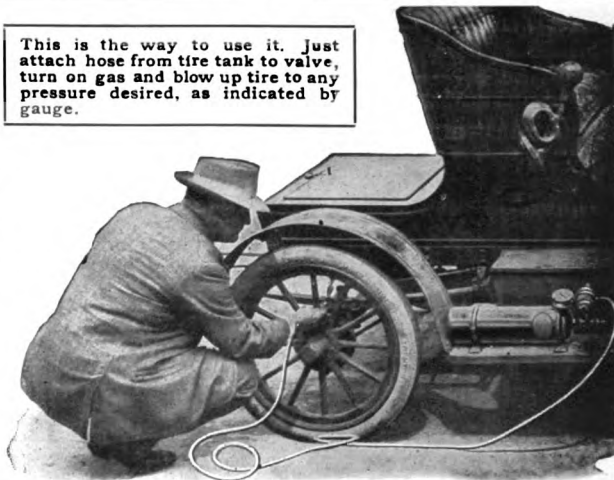
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And happy days to all who
Observe this rule of life:
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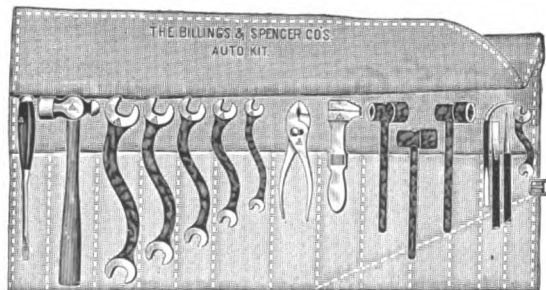
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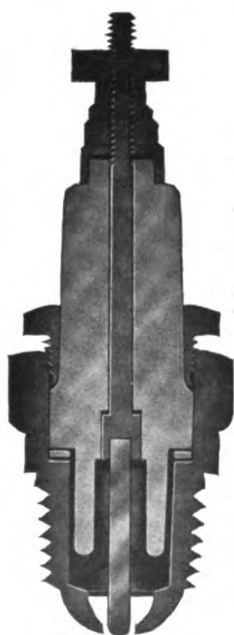
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TUNING UP A CAR—Little Things That Make a Smooth Running Motor.

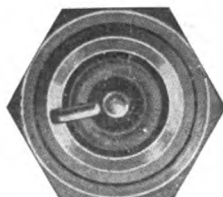
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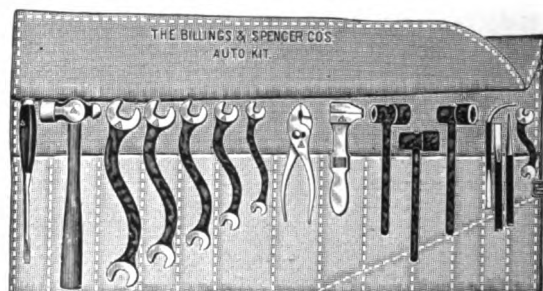
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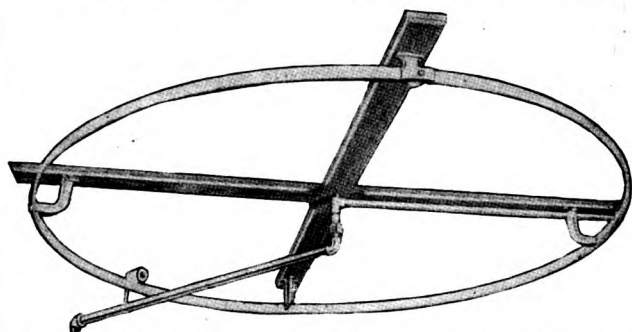
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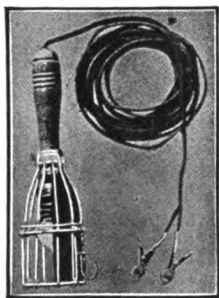
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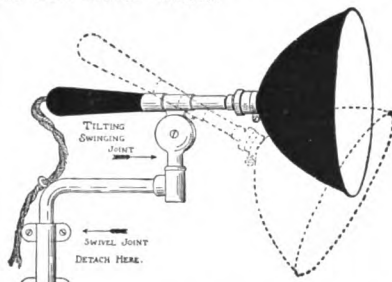
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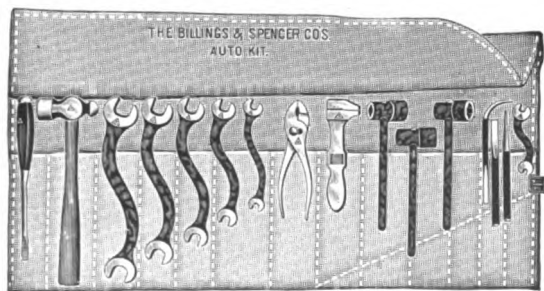
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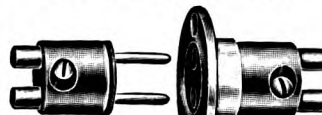


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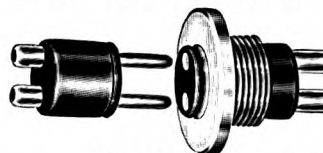
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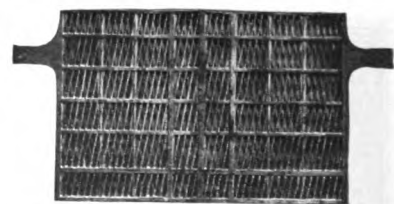
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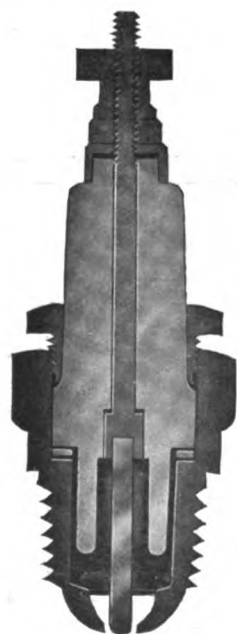
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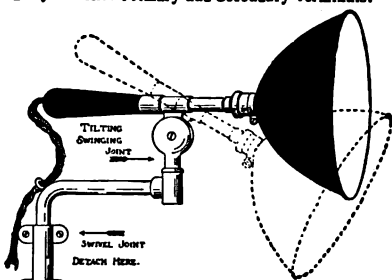
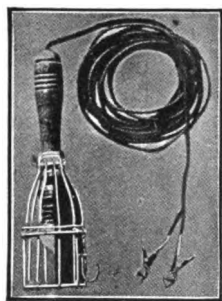
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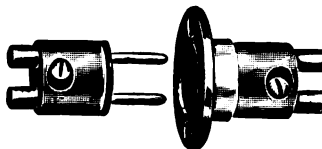
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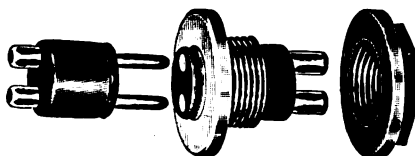
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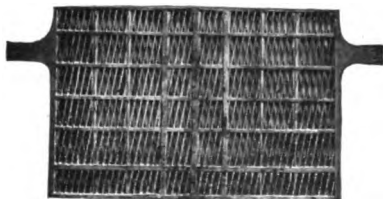
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Pamphlets now ready, sent on request.

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Inventors and
Mfrs. of the

Stow Flexible Shaft

Electric
Hand
Buffer

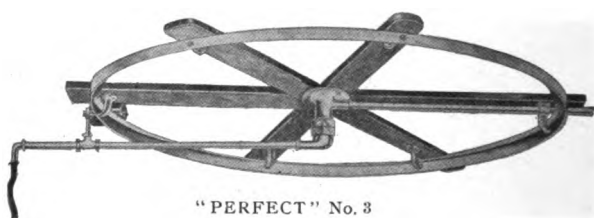
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Automobiles
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Indispensable in an Up-to-date Garage. Write us and mention this Magazine.

The "Perfect" Vehicle Washer



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FIVE STYLES—FIVE PRICES

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GOES INSIDE AND OVER BOTH BEADS.



BLOW-OUT PATCH EQUAL TO AN EXTRA TIRE.

Because twice as quick and just as safe. THE ONLY PATCH made exactly like a tire, of fabric stretched, vulcanized and tested under 250 pounds pressure, so WILL NOT BULGE.

INNER SHOE TIRE CO., Grand Rapids, Mich.

Norwood Portable Turntable, Caster or Jack on Wheels

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A CASTER to go
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A JACK on wheels
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Factories and shops can handle cars either with or without wheels. The Jack is adjustable and detachable. Write for Circular E. Discount to the trade.

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NEW YORK, FEBRUARY, 1910.

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We want to send to every reader of this paper our booklet "Lubrication," full of practical hints and suggestions. In it you will find a list of every prominent make of car and the exact grade of PANHARD OIL best suited to it. The dealer who handles PANHARD OIL secures the permanent trade of every customer. It adds to your profits.

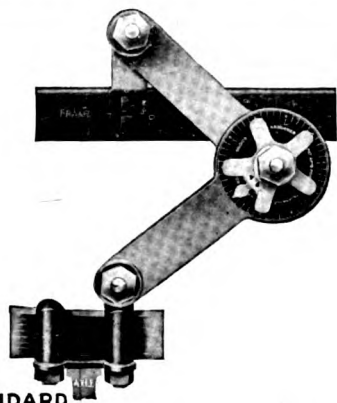
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Drop us a postal to-day. Let us submit our proposition. Let us tell how by our advertising, we make customers for you. Sit down now and mail us that postal. Simply say "Send Booklet and Sample."

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Branches in NEW YORK—212-214 West 88th Street, BOSTON—319 Columbus Avenue.

FOR INDEX TO ADVERTISEMENTS SEE PAGES 520 AND 521

A. L. A. M. Standard Screw Plates.

Every repair shop needs a LITTLE GIANT screw plate with taps and dies of A. L. A. M. standard size and pitch. All of our screw plates contain the celebrated LITTLE GIANT adjustable tap wrench—the finest ever made. Get an assortment for your shop for screw cutting repairs.

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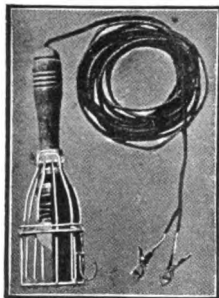


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"MORSE" TROUBLE AND SEARCH LAMPS

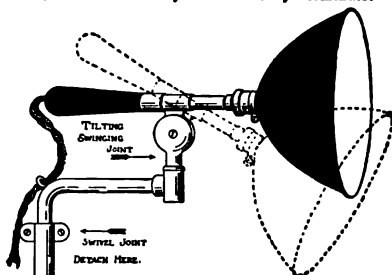
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Run by Battery or Magneto.



Style No. 27H. Silvered Guard, Handle, Reflector, 10 feet Cotton Cord, Candelabra Socket, 6v. 4 c. p. Lamp Snap Clips. Send for Illustrated Price List.

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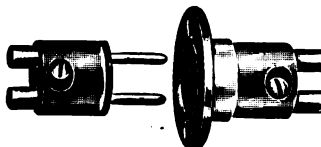


Style No. 21 is run by a battery or magneto and will throw a light 100 feet. Just what is needed for making landings, etc. It can be attached to any part of a boat and easily detached. Consists of Brass Stand, Polished Nickel Reflector, Socket, 6v. 4 c. p. Tantalum Lamp, Cord and Terminals.

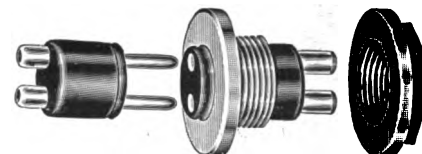
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See the Set Screws.



Panel or Dash Board.

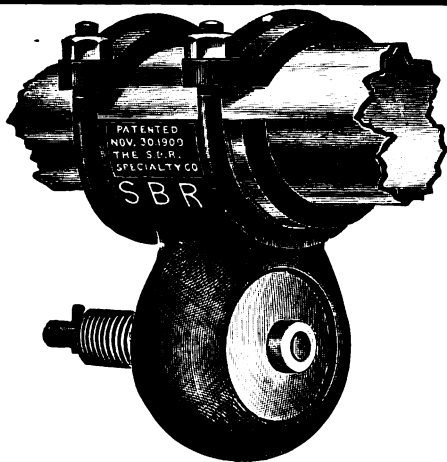


Metal Dash Board.

Automobile
Hard Rubber
Connectors,
Switches, Sockets
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Send for Illustrated
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The S. B. R. Muffler Cutout

Tells whether all your Cylinders are firing or not.

Saves clogging of your Muffler.

Eliminates back pressure when full power is needed.

A most effective warning signal.

Easily applied in few minutes.

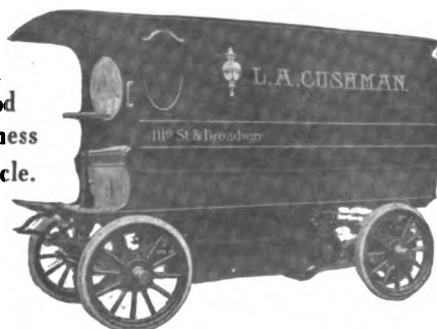
PRICES: 1-1¼-1½ in., \$3.50; 1¾-2 2¼ in., \$4.00; 2½-3 in., \$4.50.

Above sizes apply to outside diameter of exhaust pipe.

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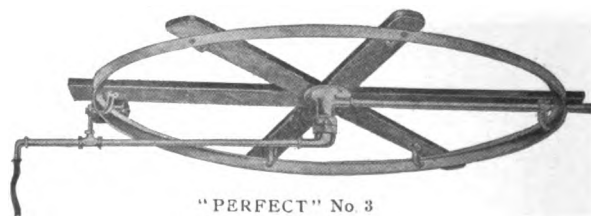
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The "Perfect" Vehicle Washer



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FIVE STYLES—FIVE PRICES

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Real Co-operation With the Dealer is our Plan

Wherever possible we want to distribute Bricton Detachable Treads through the dealer.

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Therein is a good clue for you, Mr. Dealer.

A created demand, a reliable proposition—the Bricton Detachable Tread—and your assistance, the chain of service to the motorists in your community is complete.

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Simply let the agency be known, then motorists will call on you for these superb tire protectors.

They sell themselves.

Examination by an interested motorist leads to a quick sale.

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Bricton Treads

(Detachable)

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By writing to-day?

The Bricton Mfg. Co.

Box A. D. 02

Brookings, S. Dakota, U. S. A.

Please fill out coupon and mail to-day

THE BRICTON MFG. CO.,

Box A. D. 03,

Brookings, S. Dakota, U. S. A.

Gentlemen:—

Send to me complete information pertaining to the representation of Bricton Treads locally.

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Size 66, 6 Volt, 60 Ampere Hour

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We guarantee Geiszler batteries against deterioration when standing idle, whether charged or discharged. Any Geiszler battery which fails to operate to the user's satisfaction may be returned to us at any time within twelve months from the date of sale, and the purchase price will be refunded.

We have discovered a method of treating lead storage battery plates which renders them insensitive to the acid on open circuit. In a word, we prevent the usual slow degeneration of oxide into sulphate when the battery stands idle. The oxide remains oxide, and therefore active, however long the battery stands unused.

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